This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

https://books.google.com

B 756,510

RAILWAY SIGNAL SUPPLIES

CATALOG No. 32

1895 1927

THE RAILROAD SUPPLY COMPANY
MANUFACTURERS
BEDFORD BUILDING, CHICAGO

NEW YORK BOSTON ST. LOUIS ST. PAUL
SAVANNAH HOUSTON SAN FRANCISCO
KANSAS CITY DENVER

Digitized by Google

PROPERTY OF
University of Michigan Libraries
1817
ARTES SCIENTIA VERITAS

Digitized by Google

RBS - Symbols

Digitized by Google

Digitized by Google

Catalogue No. 32

The Railroad Supply Company

Incorporated 1895

Manufacturers

Railway and Signal Supplies

In addition to our regular line we manufacture special devices to specification

THE RRS

1927

The Railroad Supply Company

Bedford Building, Chicago

NEW YORK
30 Church Street

SAN FRANCISCO
Crocker Building

SAVANNAH
414 Realty Building

ST. LOUIS
1225 Arcade Building

BOSTON
1293 Commonwealth Avenue

DENVER
512 Midland Savings Bank Building

HOUSTON
Union National Bank Building

ST. PAUL
116 East Fourth Street

(Copyrighted)

Digitized by Google

General Index

SECTION

1. Autoflags, Wig-Wags, Highway Crossing Signals, Flashing Light Signals, Illuminated Signs, Semaphore Lamps, Duplex Light Signals. Pages 4 to 50 inclusive.

2. Highway Crossing Bells, Vibrating Electric Bells, Buzzers. Pages 52 to 86 inclusive.

3. Relays, Rail Contacts, Flashers, Annunciators, Test Boxes, Push Buttons, Test Keys, Switches, Condensers, Fuses, Signal Counters. Pages 88 to 134 inclusive.

4. Non-Illuminated Signs, Relay Boxes, Parkway Cable Fittings, Bases, Cable Posts, Battery Housings, Pipe Carrier Foundations, Locks, Number Plate Holders. Pages 136 to 160 inclusive.

5. Lightning Arresters, Spark Gap Plates, Grounds, Resistances, Rheostats, Marking Tags, Terminals, Connectors. Pages 162 to 180 inclusive.

6. Wire, Bonding Supplies, Drilling Machines, Trunking and Capping, S. M. Pin Locks and Bushings, Stuffing Boxes, Insulations, Insulated Rail Joints, Chicago Derailer, Tie Plates, Bonding Data Table. Pages 182 to 208 inclusive.

7. Primary Batteries, Gravity Batteries, Battery Supplies, Storage Batteries. Pages 210 to 222 inclusive.

8. Non-Tune Rectifiers, Power-off Relays, Transformers, Lighting Units. Pages 224 to 244 inclusive.

9. Test Clips, Electrical Testing and Measuring Instruments. Pages 246 to 272 inclusive.

10. Construction and Maintenance Tools, Line Supplies. Pages 274 to 376 inclusive.

Digitized by Google

Transportation
Library

Transportation
Library
TF
357
.R15
no. 32

Section 1

Contents

"AUTOFLAG" SIGNALS
WIG-WAG SIGNALS
PILOT OR MARKER LIGHTS
HIGHWAY CROSSING SIGNALS
FLASHING LIGHT CROSSING SIGNALS
ILLUMINATED SIGNS
ELECTRIC SEMAPHORE LAMPS
TWO POSITION DUPLEX SIGNALS
CROSSING GATES

Digitized by Google

Model 5 Magnetic Autoflag

DESCRIPTION

The Model 5 Magnetic Autoflag is a highway crossing signal which gives warning by the swinging of a circular metallic disc or "banner." In the center of the banner are two lenses. Electric lamps between the lenses throw light in both directions along the highway, producing, for night indication, the effect of a swinging red lantern. A standard .25 ampere lamp is furnished for night indication, but should it be desirable to have the light sufficiently bright to serve as a day indication also, lamps of higher candle power will be furnished when specified. The lamp of the standard signal burns steadily during the operation of the signal, but arrangement can be made, if desired, to flash the lamp at intervals or in unison with the swinging of the banner.

The reserve light feature is incorporated in these signals and a hinged type lens hood is provided, permitting ready access to the lamps.

The banner of the two position signal can be marked to specification within the limits of its area. Unless otherwise specified, the banner is marked as shown in the illustrations, in accordance with A. R. A. Drawing 1553. The banner of the disappearing banner type is marked with the word "STOP" in 5½-inch black letters on a white background.

The shields between which the banner of the disappearing banner type is hidden when in the clear position, are black with large white letters "R. R."

OPERATION

The operating mechanism of this signal is a very simple magnetic movement, consisting of two electro-magnets mounted on the upper end of the banner rod and one supported directly above the banner shaft. The two magnets on the banner rod are mounted at an acute angle from the vertical. By means of a simple and reliable circuit selector, energy is applied to the magnet coils so as to cause the stationary and one of the moving coils to attract each other, causing one of the magnets mounted on the banner rod to move up under the stationary magnet, thus forcing the banner to one side. The circuit selector is actuated by this movement, closing the opposite contact which energizes the opposite moving coil so that it will be attracted to the stationary coil, thus forcing the banner in the opposite direction. This alternate action of the electro-magnets causes the banner to swing at a true pendulum speed, through an arc of approximately 45 inches.

From the circuit diagrams, the method of selectively energizing the proper coils will readily be seen. It will also be seen that the circuit selector contacts never break current, as they are closed before the roller passes over the cam and open after the roller has passed beyond the cam. The selector contacts are closed under pressure when current is flowing.

Two Position

When energy is cut off from the two position signal after a train has passed the crossing, the banner comes to rest in a vertical position ready to start again when another train enters the warning section. A brake is provided to bring the banner to rest quickly after an operation and to prevent high winds from swinging the banner.

Disappearing Banner Type

When energy is cut off from the operating coils of the disappearing banner type, it is applied to the hold clear coils which engage a latch which holds the banner in the clear position between the shields. The hold clear attachment is installed in place of the brake mechanism used on the two position signal.

If due to battery failure or other causes, the hold clear coils become de-energized, the banner is released and allowed to drop by gravity to a vertical position, displaying the word "STOP" in black letters on the white background. In this position the signal is ready to operate when energy is again applied.

Digitized by Google

Model 5 Magnetic Autoflag

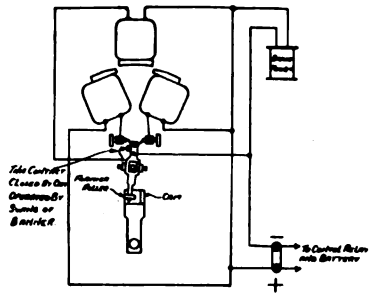
TWO POSITION — **For 6 or 8 Volts D. C.**

DISAPPEARING BANNER TYPE — **For 6 or 8 Volts D. C. or 110 Volts 60 Cycles**

CURRENT CONSUMPTION

As the main shaft supporting the banner is mounted on two ball bearings, it is apparent that very little energy is required to swing the banner.

Current is flowing in the coils only when the roller is passing over the cam, or approximately one-eighth of the time. The current drawn at this time (including that consumed by the brake coils) is approximately 2.1 amperes on an 8 volt signal. The average current is about 350 milliamperes and the actual energy consumed, as determined by measurement with exceptionally accurate instruments, is 2.75 watts. These figures do not include energy consumed by lamps or bells which, of course, consume varying amounts, depending on candle power of lamps or type of bell used.



Circuit—Two Position Signal

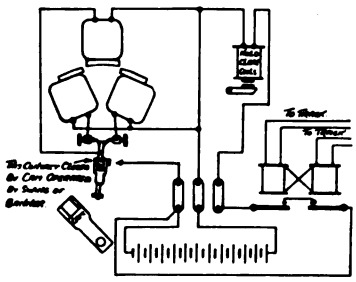
The operating energy of the Direct Current Disappearing Banner type is 2.25 watts and the hold clear coils consume 40 milliamperes while the signal is in the clear position.

A. C. Signal Disappearing Banner Type

The 110 volt 60 cycle Disappearing Banner Type Signal requires approximately 10 watts for operation (not including lights or bells). The hold clear coils consume 8 watts while the banner is held in position behind the shields.

MOUNTINGS

On pages 6 and 7 the two position mechanism is shown mounted on a channel iron framework of excellent construction so that the signal may be conveniently placed upon a safety island in the center of the street. A pilot light burning steadily is very often used on this center of street type to indicate the signal when the warning light is not burning. This is always required where street illumination is not sufficient to make the signal clearly visible (see pages 20 and 21).



Circuit—Disappearing Banner Type

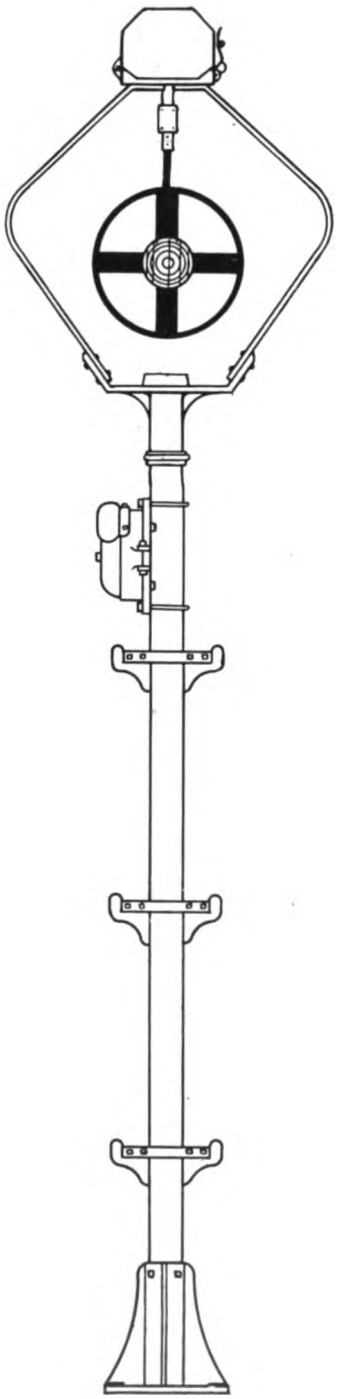
The illustrations on pages 8 and 9 show the two position signal arranged, by the use of a rigid angle iron bracket, for use at the side of a highway.

The Disappearing Banner Type Model 5 Magnetic Autoflag is shown on pages 10 and 11. This type is nearly always placed at the side of the highway.

Special assemblies will be made to meet requirements.

Digitized by Google

Model 5 Magnetic Autoflag



Center of Street Type

For 6 or 8 Volts Direct Current

Where it is desired to place the warning signal in the center of the street on a safety island, this type of Model 5 Magnetic Autoflag is recommended. Signals of this type are in service on many of the prominent railroads. A pilot light, or marker, should be placed upon the pole or foundation when the signal is located in the center of the street.

We can supply either the reflecting type or electrically lighted marker or pilot lights when specified. (See pages 20 and 21.)

The signal as illustrated consists of:

One Type C.S. Model 5 Magnetic Autoflag, with mechanism for operation on 6 or 8 volts D. C. (as specified), mechanism case mounted on channel iron frame work and illuminated banner.

No. 710. 4″x10′ pipe post (unless other length is specified).

No. 8. Extra heavy cast iron foundation base.

Three sets No. 10151 pole steps.

No. 222A. Crossing bell.

No. 51305. Complete as illustrated and listed above.

No. 51320. No. 1220A Gong type bell is furnished instead of No. 222A Bell.

No. 51344. No. 444 Locomotive type bell, with No. 161 gooseneck bracket for mounting, is furnished instead of No. 222A Bell.

No. 51355. No. 555 Gong type bell, and No. 161 gooseneck bracket for mounting, is furnished instead of No. 222A Bell.

Other types of Bell furnished as specified.

Arrangement can be made to mount No. 222C Bell on top of mechanism cover when necessary.

NOTE—Any type of crossing sign will be furnished for mounting on the pole when specified. The A. R. A. standard sign, our No. 3301, shown on page 136, is recommended.

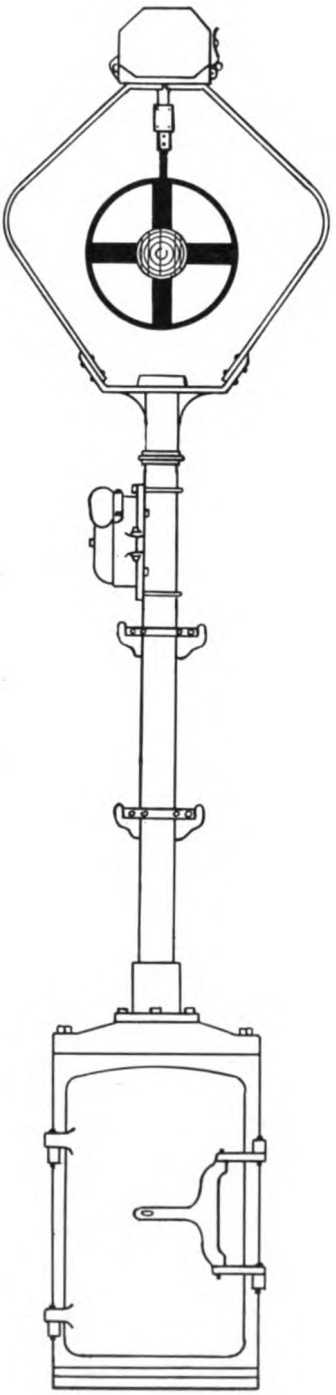
Digitized by Google

Model 5 Magnetic Autoflag

Center of Street Type

For 6 or 8 Volts Direct Current

This assembly is ideal where it is desired to place the signal at one side of the street or highway as it provides housing space for the control apparatus in the large case which will also hold storage batteries and rectifiers, as well as necessary relays, etc.



The signal as illustrated consists of:

One Type C. S. Model 5 Magnetic Autoflag, with mechanism for operation on 6 or 8 volts D. C. (as specified), mechanism case mounted on channel iron frame work and illuminated banner.

No. 706. 4"x6' pipe post (unless other length is specified).

No. 1023. Base of mast relay and battery case.

Two sets No. 10151 pole steps.

No. 222A. Crossing bell.

No. 52305. Complete as illustrated and listed above.

No. 52320. No. 1220A Gong type bell is furnished instead of No. 222A Bell.

No. 52344. No. 444 Locomotive type bell, with No. 161 gooseneck bracket for mounting, is furnished instead of No. 222A Bell.

No. 52355. No. 555 Gong type bell, and No. 161 gooseneck bracket for mounting, is furnished instead of No. 222A Bell.

Other types of Bell furnished as specified.

Arrangement can be made to mount No. 222C Bell on top of mechanism cover when necessary.

NOTE—A double door Relay Box similar to the No. 1023 can be furnished when specified. (See page 142.) The A. R. A. standard crossing sign or any other type of sign desired can be mounted on the pole when required. (See pages 136 and 137.)

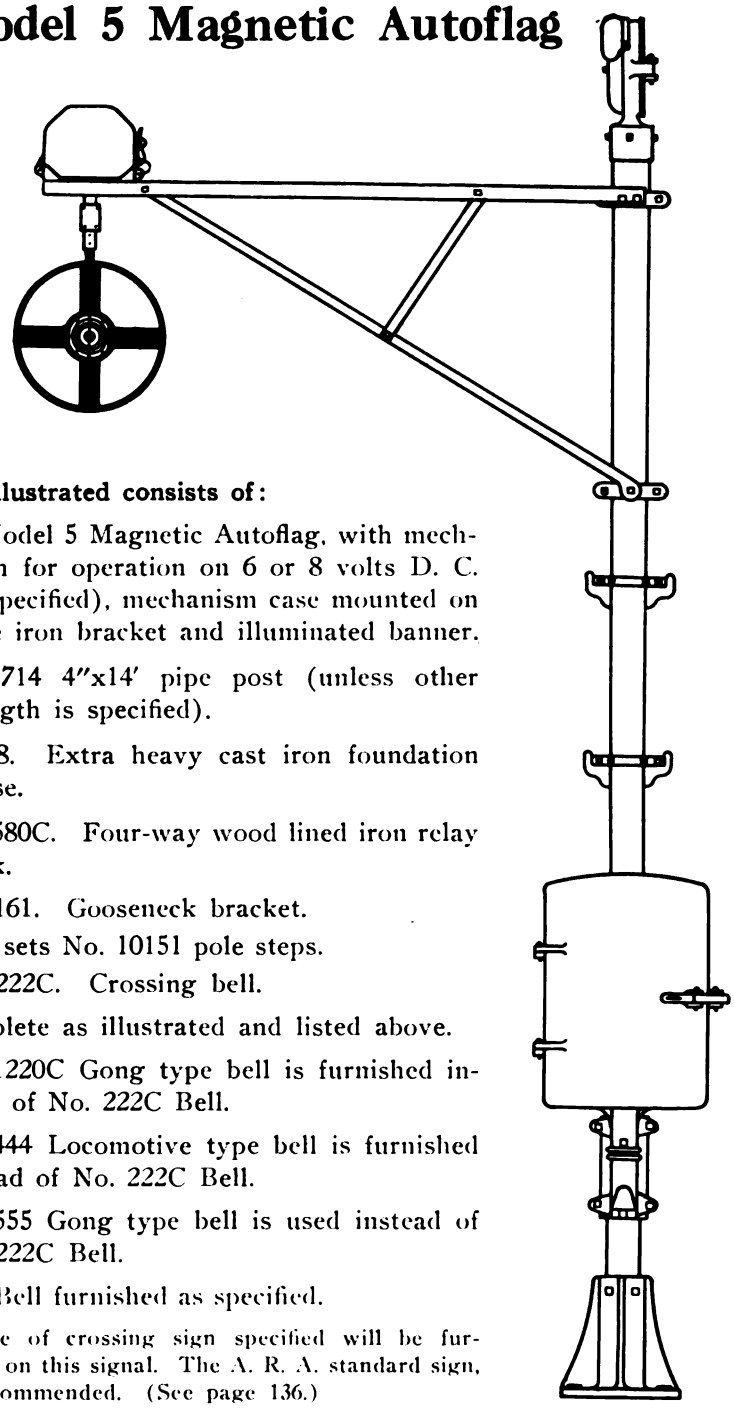
Digitized by Google

Model 5 Magnetic Autoflag

Side of Street Type

For 6 or 8 Volts Direct Current

Designed to be placed at the side of the street or highway with the banner overhanging the roadway.



The signal as illustrated consists of:

One Type S. S. Model 5 Magnetic Autoflag, with mechanism for operation on 6 or 8 volts D. C. (as specified), mechanism case mounted on angle iron bracket and illuminated banner.

No. 714 4"x14' pipe post (unless other length is specified).

No. 8. Extra heavy cast iron foundation base.

No. 580C. Four-way wood lined iron relay box.

No. 161. Gooseneck bracket.

Two sets No. 10151 pole steps.

No. 222C. Crossing bell.

No. 51205. Complete as illustrated and listed above.

No. 51220. No. 1220C Gong type bell is furnished instead of No. 222C Bell.

No. 51244. No. 444 Locomotive type bell is furnished instead of No. 222C Bell.

No. 51255. No. 555 Gong type bell is used instead of No. 222C Bell.

Other types of Bell furnished as specified.

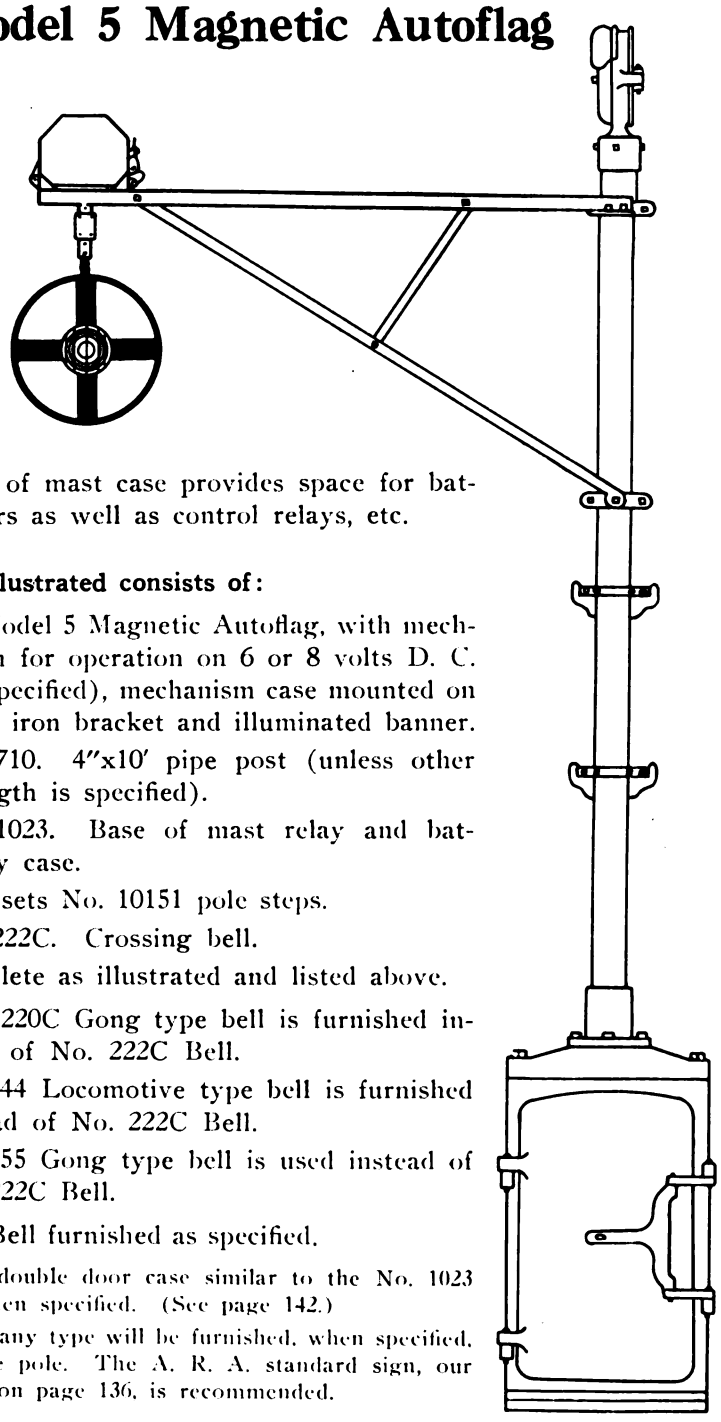
NOTE—Any type of crossing sign specified will be furnished for mounting on this signal. The A. R. A. standard sign, our No. 3301, is recommended. (See page 136.)

Digitized by Google

Model 5 Magnetic Autoflag

Side of Street Type

For 6 or 8 Volts Direct Current



Designed to be placed at the side of the street or highway with the banner overhanging the roadway.

The large base of mast case provides space for batteries and rectifiers as well as control relays, etc.

The signal as illustrated consists of:

One Type S. S. Model 5 Magnetic Autoflag, with mechanism for operation on 6 or 8 volts D. C. (as specified), mechanism case mounted on angle iron bracket and illuminated banner.

No. 710. 4"x10' pipe post (unless other length is specified).

No. 1023. Base of mast relay and battery case.

Two sets No. 10151 pole steps.

No. 222C. Crossing bell.

No. 52205. Complete as illustrated and listed above.

No. 52220. No. 1220C Gong type bell is furnished instead of No. 222C Bell.

No. 52244. No. 444 Locomotive type bell is furnished instead of No. 222C Bell.

No. 52255. No. 555 Gong type bell is used instead of No. 222C Bell.

Other types of Bell furnished as specified.

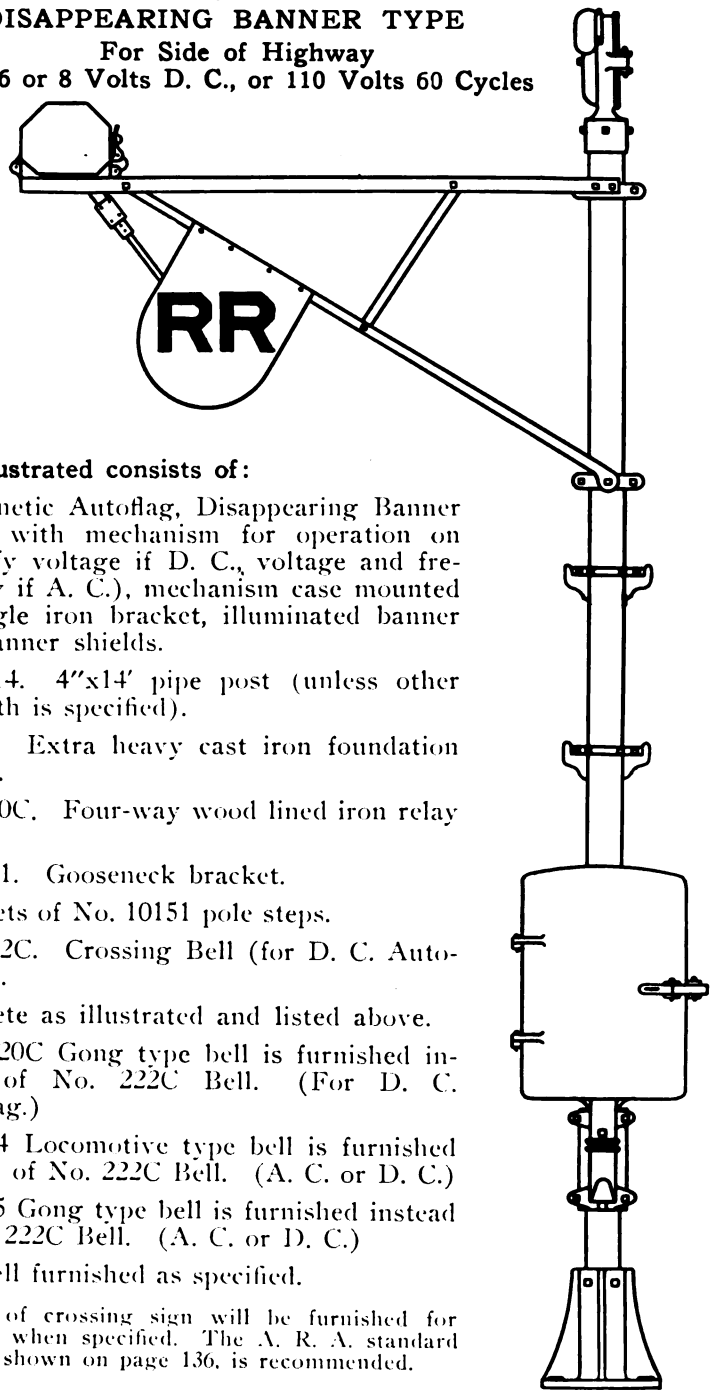
NOTE—A large double door case similar to the No. 1023 will be furnished when specified. (See page 142.)

Crossing signs of any type will be furnished, when specified, for mounting on the pole. The A. R. A. standard sign, our No. 3301, as shown on page 136, is recommended.

Digitized by Google

Model 5 Magnetic Autoflag

DISAPPEARING BANNER TYPE
For Side of Highway
For 6 or 8 Volts D. C., or 110 Volts 60 Cycles



Designed to be placed at the side of the highway with the banner overhanging the roadway. The four-way box will hold the control relays but not the batteries or charging apparatus.

The signal as illustrated consists of:

One Model 5 Magnetic Autoflag, Disappearing Banner Type, with mechanism for operation on (specify voltage if D. C., voltage and frequency if A. C.), mechanism case mounted on angle iron bracket, illuminated banner and banner shields.

No. 714. 4″x14′ pipe post (unless other length is specified).

No. 8. Extra heavy cast iron foundation base.

No. 580C. Four-way wood lined iron relay box.

No. 161. Gooseneck bracket.

Two sets of No. 10151 pole steps.

No. 222C. Crossing Bell (for D. C. Autoflag).

No. 51405. Complete as illustrated and listed above.

No. 51420. No. 1220C Gong type bell is furnished instead of No. 222C Bell. (For D. C. Autoflag.)

No. 51444. No. 444 Locomotive type bell is furnished instead of No. 222C Bell. (A. C. or D. C.)

No. 51455. No. 555 Gong type bell is furnished instead of No. 222C Bell. (A. C. or D. C.)

Other types of Bell furnished as specified.

NOTE—Any type of crossing sign will be furnished for mounting on the pole when specified. The A. R. A. standard sign, our No. 3301, as shown on page 136, is recommended.

Digitized by Google

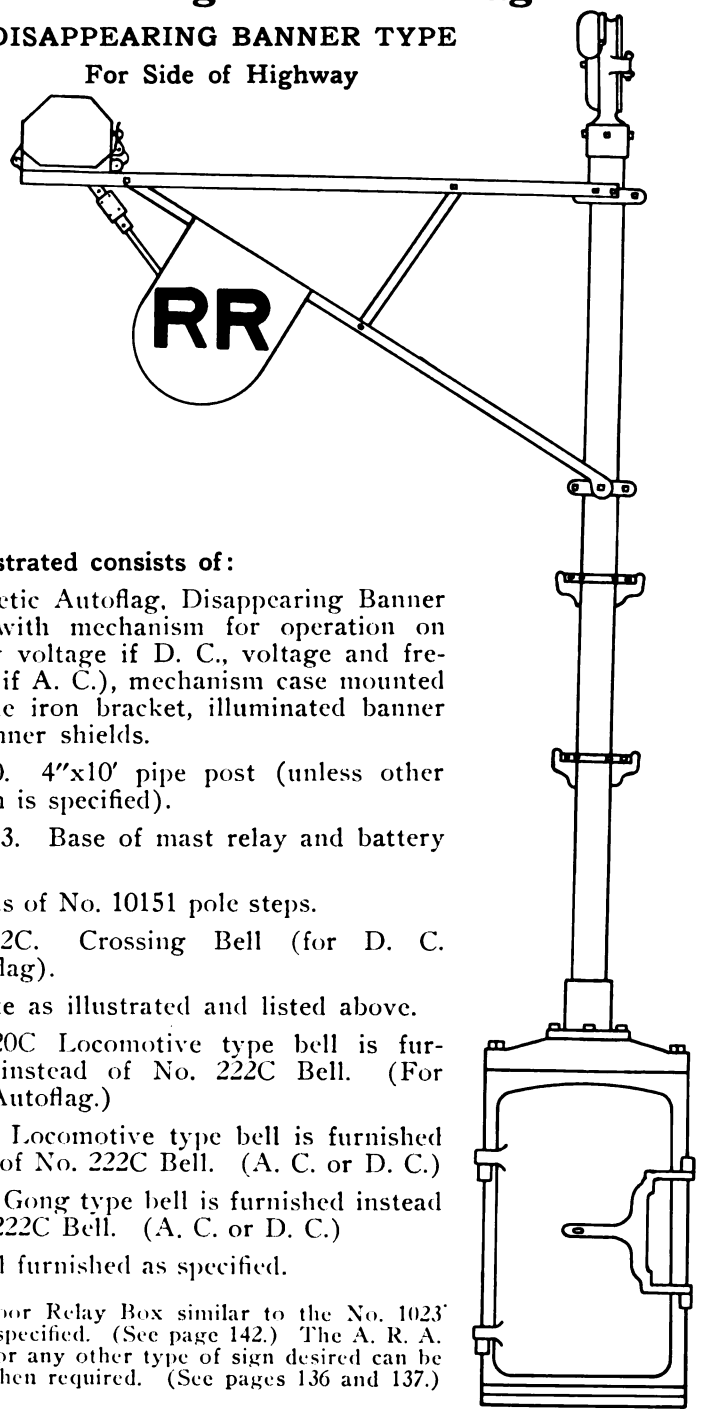
Model 5 Magnetic Autoflag

DISAPPEARING BANNER TYPE

For Side of Highway

For 6 or 8 Volts D.C., or 110 Volts 60 Cycles

Designed to be placed at the side of the highway with the banner overhanging the roadway. The base of mast case will hold all control relays and the batteries and charging apparatus as well.



The signal as illustrated consists of:

One Model 5 Magnetic Autoflag, Disappearing Banner Type, with mechanism for operation on (specify voltage if D. C., voltage and frequency if A. C.), mechanism case mounted on angle iron bracket, illuminated banner and banner shields.

No. 710. 4"x10' pipe post (unless other length is specified).

No. 1023. Base of mast relay and battery case.

Two sets of No. 10151 pole steps.

No. 222C. Crossing Bell (for D. C. Autoflag).

No. 52405. Complete as illustrated and listed above.

No. 52420. No. 1220C Locomotive type bell is furnished instead of No. 222C Bell. (For D. C. Autoflag.)

No. 52444. No. 444 Locomotive type bell is furnished instead of No. 222C Bell. (A. C. or D. C.)

No. 52455. No. 555 Gong type bell is furnished instead of No. 222C Bell. (A. C. or D. C.)

Other types of Bell furnished as specified.

NOTE—A double door Relay Box similar to the No. 1023 can be furnished when specified. (See page 142.) The A. R. A. standard crossing sign or any other type of sign desired can be mounted on the pole when required. (See pages 136 and 137.)

Digitized by Google

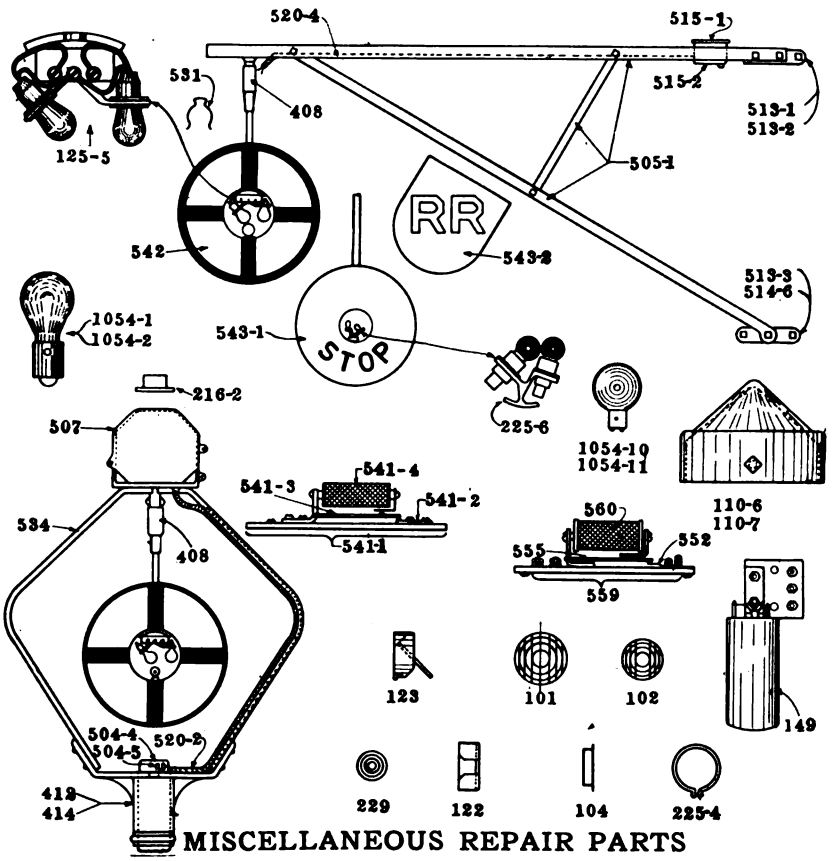
Model 5 Magnetic Autoflag

MECHANISM REPAIR PARTS

No.	Description
1X-6.	Fillister head machine screw.
2X-7.	Flat head machine screw.
3X-19.	Round head machine screw.
3X-34.	Round head machine screw.
8X-17.	Hex. head cap screw.
8X-20.	Hex. head cap screw.
12X-7.	Hex. nut.
13X-4.	Washer.
215-2.	Locking hasp.
506.	Mechanism base.
506-2.	Stopping plunger complete.
506-3.	Plunger stem only.
506-4.	Plunger spring only.
506-8.	90 degree BX connector.
506-9.	Stopping plunger cotter.
506-10.	Stopping plunger lock nut only.
506-12.	Straight BX connector.
508.	Bearing cap.
509.	Brake segment.
510-1.	Operating coil. (Specify operating voltage.)
510-2.	Brake coil. (Specify operating voltage.)
510-3.	Brake magnet core.
510-20.	Condenser and bracket complete.
510-21.	Wiring cable complete.
511-1.	Brake armature.
511-3.	Brake armature pivot.
511-5.	Brake tension adjusting nut.
511-6.	Brake tension spring.
511-16.	Brake shoe with leather.
511-17.	Fulcrum screw.
511-18.	Brake mechanism support.
511-20.	Lock nut.
513-5.	Locking hasp spring.
514-7.	Contact operating cam.
516-1.	Formica contact base.
516-5.	Selector contact arm complete.
516-24.	Selector contact supporting bridge complete with headless pivot screw and lock nut.
517-4.	Contact spring.
517-6.	Selector contact screw.
517-8.	Formica plunger.
517-12.	Pivot screw.
517-14.	Operating contact screw.
517-19.	Formica roller.
518.	Rocker arm complete.
518-2.	Formica terminal block (Dwg. 568).
518-3.	Formica insulation plate (Dwg. 569).
518-9.	Ball bearing complete.
563.	Magnet shoe.
564.	Stationary magnet core.
10565.	Porcelain terminal block.

Digitized by Google

Model 5 Magnetic Autoflag



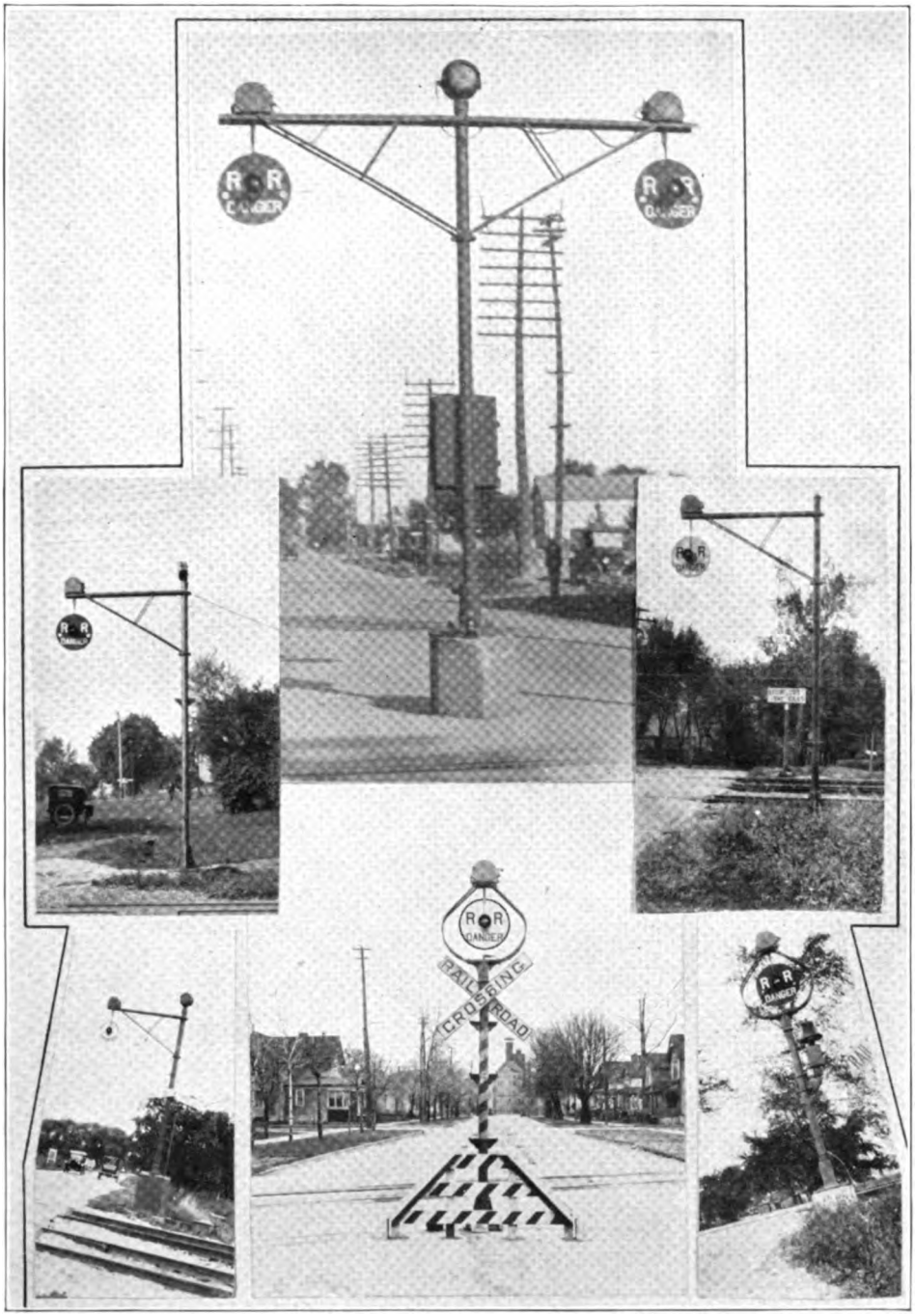
MISCELLANEOUS REPAIR PARTS

No.	Description
101.	6⅜" red "spread-lite" lens.
102.	5⅜" red "spread-lite" lens.
104.	Reducer ring for 5⅜" lenses.
110-6.	Pipe pinnacle for 4" I.D. pipe post.
110-7.	Pipe pinnacle for 3½" I.D. pipe post.
122.	Standard lens hood.
123.	Hinged lens hood.
125-5.	Lamp bracket complete with 6-8 volt lamps for No. 542 banner.
149.	Inclosed type light out relay (Dwg. 525).
216-2.	Bell socket (specify style of bell).
225-4.	4½" lens retaining ring for No. 543-1 banner.
225-6.	Lamp bracket, complete with 6-8 volt lamps for No. 543-1 banner.
229.	4½" red optical lens.
408.	Banner junction box.
412.	Support socket for 5" I.D. pipe post.
414.	Support socket for 4" I.D. pipe post.
504-4.	Terminal cover.
504-5.	Terminal bracket.
505-1.	Angle iron bracket, complete less clamps.
507.	Mechanism cover.
513-1.	Upper clamp, complete for 4" I.D. pipe post.
513-2.	Upper clamp, complete for 5" I.D. pipe post.
513-3.	Lower clamp, complete for 4" I.D. pipe post.
514-6.	Lower clamp, complete for 5" I.D. pipe post.
515-1.	Bracket junction box cover.
515-2.	Bracket junction box with terminal block and BX connector.
520-2.	Twin conductor steel covered cable.
520-4.	Twin conductor steel covered cable.
531.	Banner locking spring.
534.	Bracket channel iron (4 required).
541-1.	Reserve light relay.
541-2.	Reserve light relay back contact.
541-3.	Reserve light relay armature.
541-4.	Reserve light relay coil.
542.	Banner, complete as shown (no lenses nor hoods) for Two Position Autoflags (A. R. A. Dwg. No. 1553 unless otherwise specified).
543-1.	Banner, complete as shown (no lenses nor hoods) for Disappearing Banner Type Autoflag (specify stenciling desired and lamp voltage).
543-2.	Set of two banner shields.
552.	Improved type reserve light relay back contact.
555.	Improved type reserve light relay armature.
559.	Improved type reserve light relay, complete.
560.	Improved type reserve light relay coil.
1054-1.	6-8 volt single contact bayonet base lamp.
1054-2.	8-10 volt single contact bayonet base lamp.
1054-10.	6-8 volt double contact bayonet base lamp.
1054-11.	8-10 volt double contact bayonet base lamp.

Digitized by Google

TYPICAL INSTALLATION OF MODEL 5 MAGNETIC "AUTOFLAG"

Digitized by Google



MODEL 5 MAGNETIC "AUTOFLAGS"
Protecting Important Crossings

Digitized by Google

Style "T" Wig-Wag

MOTOR-DRIVEN HIGHWAY CROSSING SIGNAL

DESCRIPTION

The style "T" Wig-Wag crossing signal is a motor-driven mechanism which mechanically swings a disc or banner back and forth to give a visual warning to highway traffic of the approach of a train. The banner, which is marked in accordance with A. R. A., signal section, drawing number 1553, unless otherwise specified, is intended for day indication. In the center of the banner between two red spreadlite lenses are lamps which provide a swinging red light for night indication. Where required, high candle power lamps can be provided to give a light brilliant enough for day indication. Unless otherwise specified, however, a low candle power lamp will be furnished.

Two lamps in the banner are arranged so that one of them, in focus with both lenses, burns normally, but in case this normal lamp burns out, a special low resistance light-out relay cuts in the reserve light, which is set above the normal light, thus forestalling light failures. A hinged type lens hood is provided on one end of the lamp case to facilitate access to the lamps and the cleaning of the lenses.

Mechanism

The mechanism consists of a motor and train of gears, together with rocker arm and crank, mounted on a unit base with cover. The entire mechanism is removable from the bracket without dismantling except for detaching the banner and lead in wires. A junction box in the banner rod facilitates the removal of the banner. Specially designed, impregnated bushings are used in all important bearings practically eliminating the necessity of oil lubrication.

Operation

The signal is installed and controlled the same as a crossing bell. When a train, approaching the crossing, enters the controlling circuit, the banner swings back and forth for day indication and the red light produces the effect of a swinging red lantern for night indication or by day as well if high candle power lamps are used. In addition to these visible warnings, a crossing bell of either the gong or locomotive type, as desired, is recommended to give an audible warning, especially where pedestrians are using the crossing.

The signal can be furnished for use on any specified direct current voltage from 6 to 600 and for use on alternating current of either 110 or 220 volts of commercial frequencies.

Mountings

The most popular assembly using this signal is shown on the opposite page and several types of installation are illustrated on page 19. Assemblies for placing the signal in the center of the street are there illustrated.

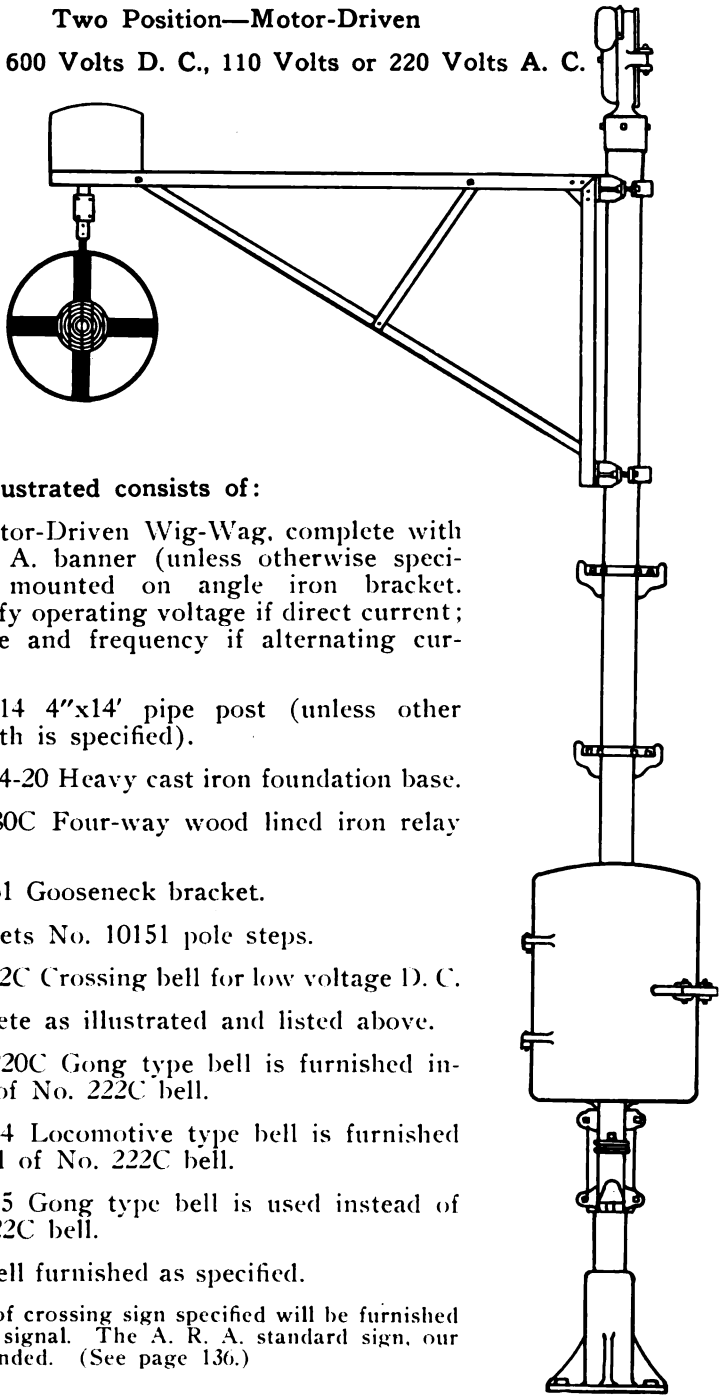
Special assemblies or variations from assemblies already in use can be made from standard parts to meet requirements of any location.

Digitized by Google

Style "T" Wig-Wag

Two Position—Motor-Driven

For 6 to 600 Volts D. C., 110 Volts or 220 Volts A. C.



This assembly shows a very popular signal for installation at the side of a highway with the banner overhanging the roadway. Some of the installations using short brackets for erection in the center of the street are shown on page 19 in the lower corners. Prices and data on special assemblies will be furnished on request.

The signal as illustrated consists of:

One Style "T" Motor-Driven Wig-Wag, complete with A. R. A. banner (unless otherwise specified), mounted on angle iron bracket. (Specify operating voltage if direct current; voltage and frequency if alternating current.)

No. 714 4"x14' pipe post (unless other length is specified).

No. 874-20 Heavy cast iron foundation base.

No. 580C Four-way wood lined iron relay box.

No. 161 Gooseneck bracket.

Two sets No. 10151 pole steps.

No. 222C Crossing bell for low voltage D. C.

No. 53205. Complete as illustrated and listed above.

No. 53220. No. 1220C Gong type bell is furnished instead of No. 222C bell.

No. 53244. No. 444 Locomotive type bell is furnished instead of No. 222C bell.

No. 53255. No. 555 Gong type bell is used instead of No. 222C bell.

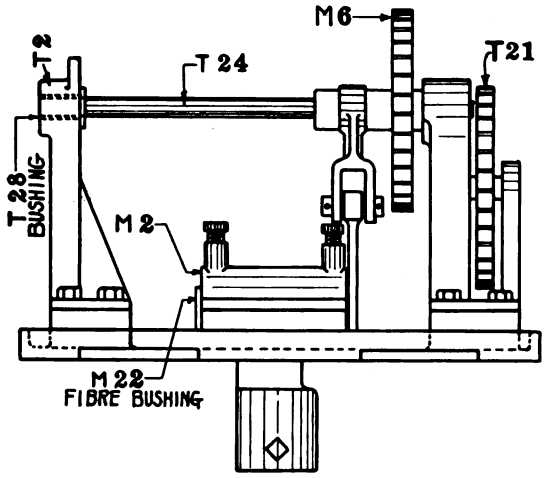
Other types of Bell furnished as specified.

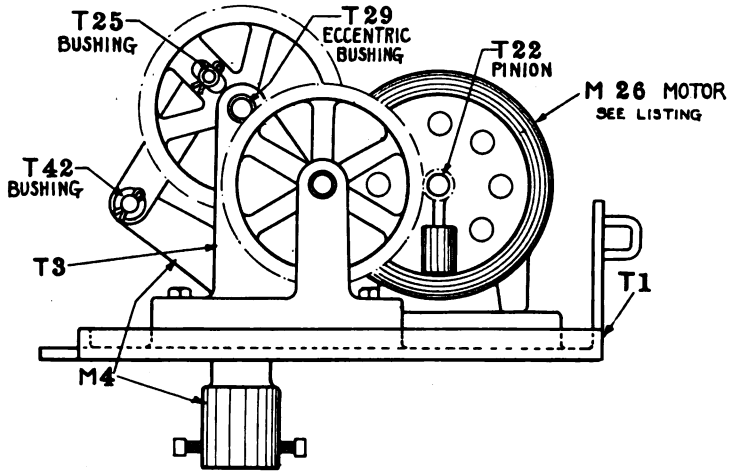
NOTE—Any type of crossing sign specified will be furnished for mounting on this signal. The A. R. A. standard sign, our No. 3301, is recommended. (See page 136.)

Digitized by Google

Style "T" Wig-Wag

REPAIR PARTS

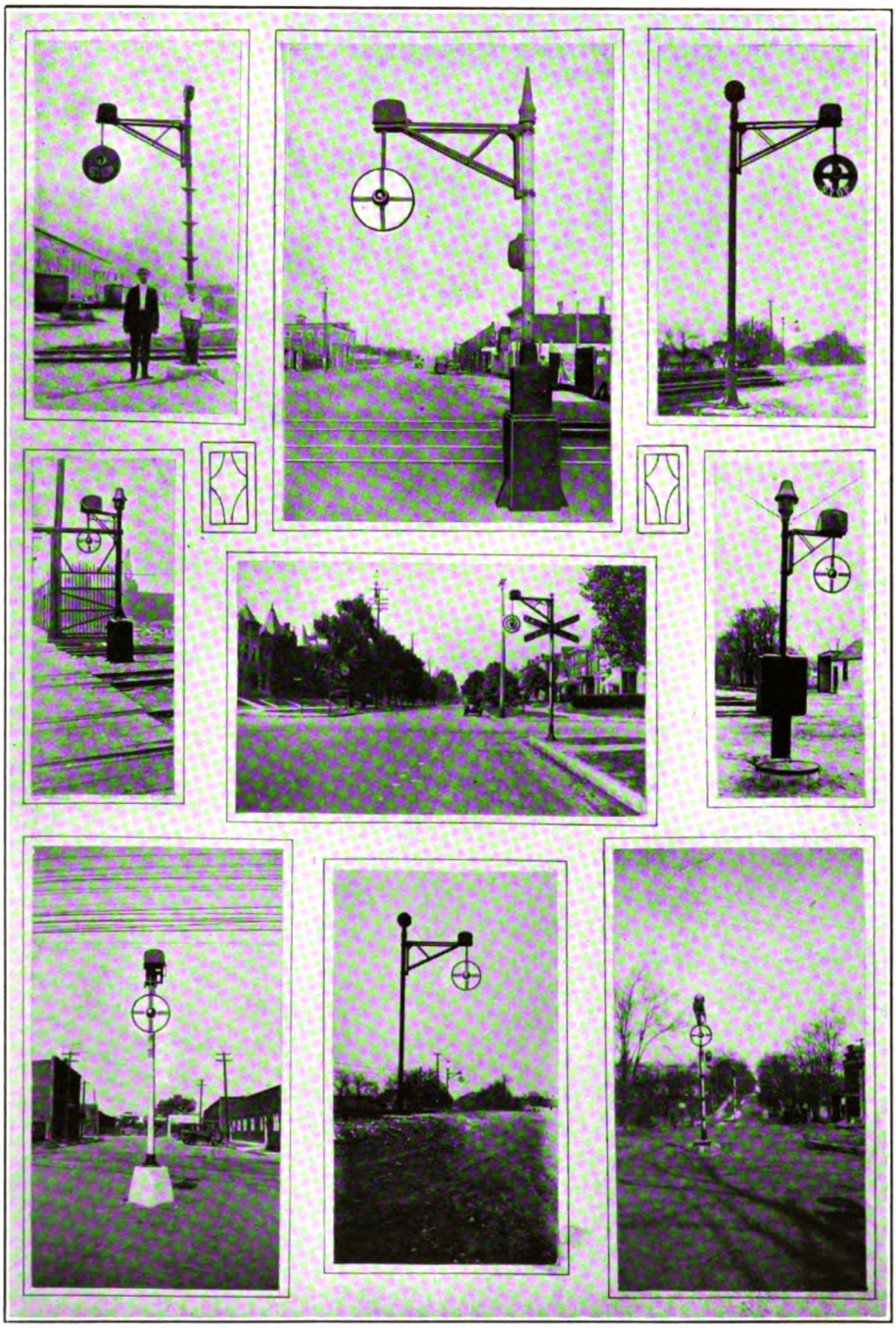




No.	Description
T-2.	Pedestal.
T-3.	Pedestal.
T-21.	Connecting gear.
T-22.	Motor pinion.
T-24.	Eccentric shaft and connecting rod.
T-25.	Hardened steel bushing.
T-28.	Shaft bushing.
T-29.	Eccentric bushing.
T-33.	Mechanism cover.
T-42.	Rocker arm bushing.
T-60.	Lens—specify size.
T-61.	Lens hood.
T-62.	Lamp bulb—specify voltage and style of base.
T-63.	Lamp socket—specify style of base.
T-70.	Two position disc or banner, complete.
M-2.	Rocker arm cap.
M-4.	Rocker arm brass casting.
M-6.	Drive gear.
M-22.	Fibre bushing.
M-26-A.	8-volt D. C. motor.
M-26-B.	10-volt D. C. motor.
M-26-C.	110-volt D. C. motor.
M-26-D.	110-volt 25 cycle motor.
M-26-E.	110 volt 50 cycle motor.
M-26-F.	110-volt 60 cycle motor.
M-26-G.	6-volt D. C. motor.
M-26-H.	220-volt D. C. motor.

NOTE—For A. R. A. banner and banner parts, see Model 5 Repair Parts, page 13. When ordering, specify "For Style 'T' Wig-Wag."

Digitized by Google

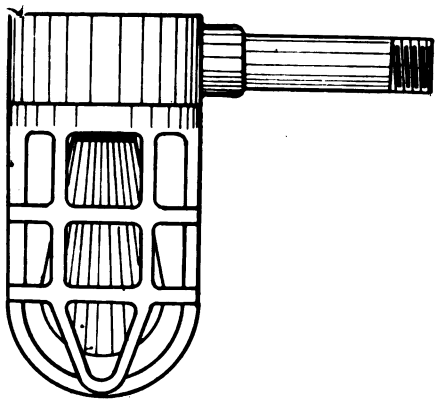


Center of Street Mounting | Side of Street Mounting | Center of Street Mounting

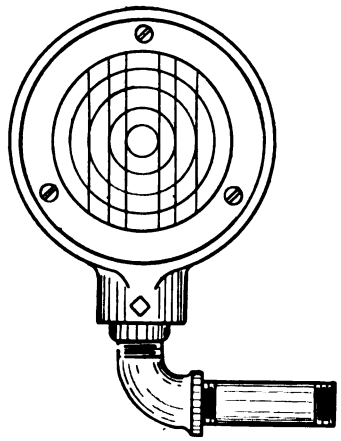
Showing Various Typical Installations of the Style "T" Wig-Wag Crossing Signals

Digitized by Google

Pilot or Marker Lights



No. 675



No. 678

The present tendency to locate highway crossing signals in the center of the roadway necessitates the provision of a marker light to designate the signal at night to prevent accidents due to the obstruction.

Where low voltage lamps are to be used, we recommend our No. 678 Pilot or Marker Light which may be mounted on the side of the signal pole. It is equipped with 4½" spread-lite lenses of yellow, red or other color as specified and with socket for the S-11 bulb type lamps of either single or double contact bayonet base.

Where it is desired to use commercial current for the lamps, we recommend our No. 675 Pilot or Marker Light, which provides for the use of standard medium screw base lamp and is provided with weatherproof globe, of color specified, and wire guard for protection.

Both types are arranged for tapping the pole with ¾" pipe thread.

DESCRIPTION

No. 675. Pilot or Marker Light for medium screw base lamps up to 40 watts, less lamp bulb. (Specify color of globe desired.)

No. 678D. Pilot or Marker Light, complete with double contact, bayonet base, S-11 bulb lamp. (Specify voltage of lamp and color of lenses required.)

No. 678S. Pilot or Marker Light, complete with single contact, bayonet base, S-11 bulb lamp. (Specify voltage of lamp and color of lenses required.)

Digitized by Google

The Road Pilot

REFLECTING TYPE MARKER LIGHTS

No. 8101—with sign

No. 12183—with sign

The Road Pilot is a reflecting type of signal which has a large area of reflecting surface. Automobile headlights reflect a powerful light to motorists which cannot be mistaken for lanterns or other burning lights.

They are ideal for erection near the railroad to caution approaching vehicles and can be furnished without signs or markers or with any type of sign such as "STOP," "CAUTION," "DANGER," "RR" or similar sign.

This type of sign is frequently used to protect an obstruction in the center of a highway. Many are used, erected on a pipe post or secured to the foundation or pole of a Flashing Light Crossing Signal or autoflag or wig-wag, to prevent motorists from running into the signals when erected in the center of the roadway. The signals are made in two sizes, the smaller size is 15″x15″, outside measurements and has 80 square inches of reflecting surface. The larger size is 17″x19″ outside measurements and has 135 square inches of reflecting surface.

Either type will be furnished with socket for mounting on top of 2″ I.D. pipe post or with bracket and "U" bolts for fastening to the side of a pipe post of specified diameter. Red, green or amber lenses furnished as specified.

DESCRIPTION

No. 8101. Large size Road Pilot with socket for mounting on top of 2″ pipe post.

No. 8102. Large size Road Pilot with bracket and "U" bolts for fastening to side of post. (Specify diameter of post.)

No. 12183. Small size Road Pilot with socket for mounting on top of 2″ pipe post.

No. 12184. Small size Road Pilot with bracket and "U" bolts for fastening to side of post. (Specify diameter of post.)

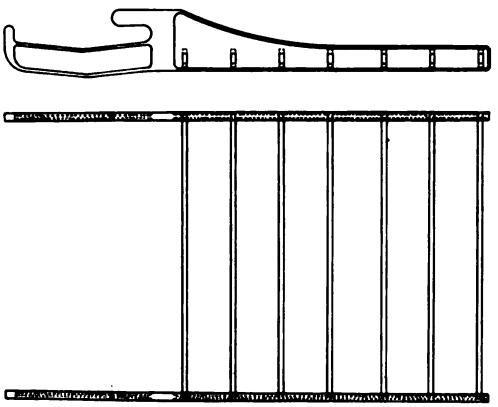
Specify lettering of sign to be mounted above the reflector if desired.

Digitized by Google

Portable Inspection Platform

FOR MODEL 5 MAGNETIC AUTOFLAG

Center of Street Type



The inspection platform has been designed to facilitate inspection and adjustment of the mechanism of Model 5 Center of Street Type Autoflags.

It provides a platform on which to stand that permits the use of both hands in adjusting and allows inspection of the signal in operation.

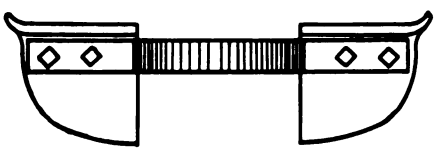
The platform weighs but fifteen pounds and is therefore readily portable. It attaches to the channel iron frame work, as shown, by simply slipping it over the support casting and allowing it to drop in place.

The weight makes it possible to easily place and adjust the platform with one hand.

This platform should be on every maintenance territory where Center of Street Type of Signals are in service.

No. 1070. Portable Inspection Platform.

Pole Steps



To readily ascent signal poles the iron pole steps are essential. We provide a sufficient number of pole steps with each signal when shipped, but many signals have been relocated or applied to existing poles and do not have a sufficient number of pole steps to provide for easy climbing.

Men will inspect mechanisms more frequently if they can reach the mechanism easily. For this reason an adequate number of pole steps should always be provided.

No. 10150. Iron pole step for 3½″ I.D. pipe post.

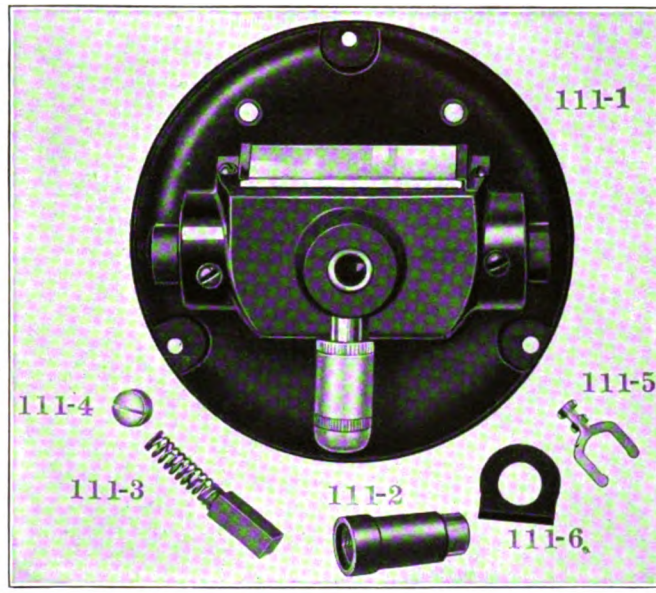
No. 10151. Iron pole step for 4″ I.D. pipe post.

No. 10152. Iron pole step for 5″ I.D. pipe post.

Digitized by Google

Enclosed Motor End Plate

WITH SQUARE BRUSHES



All type "D" 20 D. C. motors used in our motor-driven Autoflags and Crossing Bells are now equipped with the enclosed motor end plate shown above, and are thoroughly sealed against dust and frost accumulation.

Square brushes are provided which cannot rotate in the brush holder and the brushes, when once seated, remain in good contact with the commutator throughout their entire life.

A glass covered opening above the commutator permits easy inspection without opening the motor. The glass is fitted with a rubber gasket, making the entire motor air tight.

These motor end plates fit all type "D" 20 and style "B" motors now in service and may be applied to old motors in the field with no difficulty. In ordering, specify shaft diameter.

When attaching these new enclosed motor end plates to motors now in service, to secure the advantages of the square brushes and covered commutators, the motor may also be made air tight by placing a gasketed metal disc over the vent holes in the plate at the pinion end of the motor, thus making the motor as efficient and serviceable as the newer types now being furnished in our motor-driven apparatus.

Ordering Reference

No. 111-1. Motor end plate complete for field application to motors now in service.

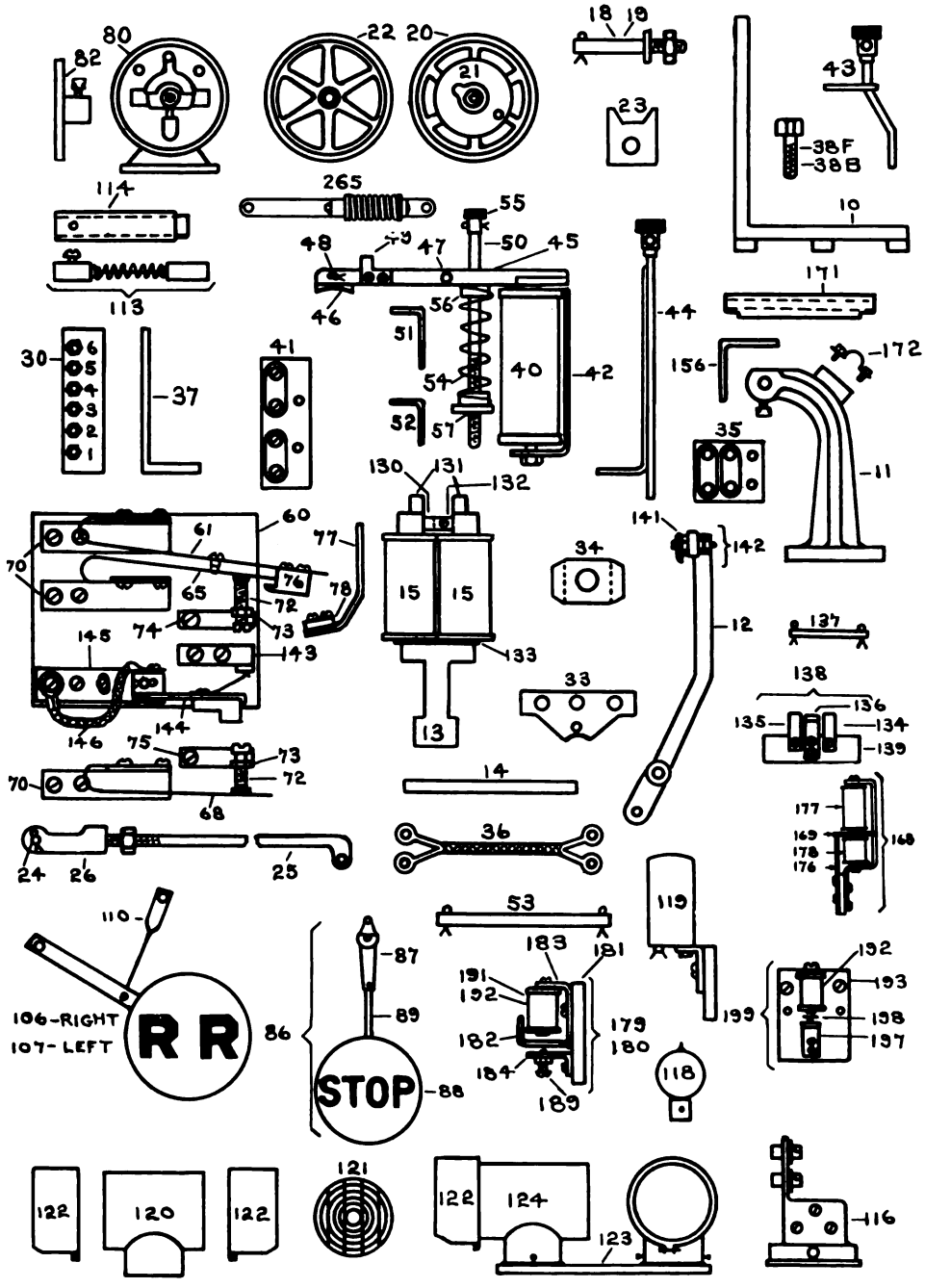
Repair Parts

No. 111-2. Brush holder sleeve.
No. 111-3. Motor brush and tension springs.
No. 111-4. Tension screw.
No. 111-5. Connection clip.
No. 111-6. Connection clip insulator.

Digitized by Google

Model 2 Low Voltage D. C. Autoflag

REPAIR PARTS



Digitized by Google

Model 2 Low Voltage D. C. Autoflag

REPAIR PARTS—(Continued)

No.	Description
10.	Movement base.
11.	Shaft support.
12.	Driving arm only.
13.	Slot yoke.
14.	Shaft.
15.	Slot coil (specify core or form wound).
18.	Drive gear stud.
19.	Intermediate gear stud.
20.	Drive gear only.
21.	Drive plate complete with pin.
22.	Intermediate gear and pinion.
23.	Drive gear stud lock.
24.	Drive rod jaw pin.
25.	Drive rod and lock nut only.
26.	Drive rod jaw.
30.	Terminal block.
33.	Slot coil terminal block.
34.	Flexible connection clip.
35.	Slot connection block.
36.	Flexible slot connection.
37.	Terminal block bracket.
38-B.	Gear frame cap screw 1¼" long.
38-F.	Gear frame cap screw 1½" long.
40.	Brake coil.
41.	Brake coil terminal block.
42.	Brake coil bracket.
43.	Intermediate gear oil pipe.
44.	Drive gear oil pipe.
45.	Brake lever only.
46.	Brake shoe.
47.	Brake lever pin.
48.	Brake shoe pin.
49.	Brake lever lifting block.
50.	Brake adjustment rod.
51.	Upper brake rod guide.
52.	Lower brake rod guide.
53.	Banner socket shaft.
54.	Brake spring.
55.	Brake rod cap.
56.	Brake spring bushing.
57.	Brake tension bushing.
60.	Circuit breaker base.
61.	Upper contact spring.
65.	Intermediate contact spring.
68.	Brake contact spring (old style).
70.	Contact spring support.
72.	Contact screw.
73.	Contact screw lock nut.
74.	Intermediate contact screw support.
75.	Brake contact screw support (old style).
76.	Intermediate contact lifting block.
77.	Intermediate contact operating arm.
78.	Operating arm insulation.
80.	Motor, low voltage D. C.
82.	Brake wheel.
86.	Banner complete.
87.	Banner socket only.
88.	Banner disc only.
89.	Banner pipe only.
106.	Banner shield, right hand.
107.	Banner shield, left hand.
110.	Banner shield hanger.
113.	Motor brush.
114.	Motor brush sleeve.
116.	Standard lamp support.
118.	6-8 volt 2 c. p. bayonet base lamp.
119.	Reserve light relay (old style).
120.	Standard lamp case.
121.	5⅜" red spread-lite lens.
122.	Lens hood.
123.	Duplex lamp bracket.
124.	Lamp case for duplex lights.
130.	Armature support strap.
131.	Armature shaft support.
132.	Drive arm stop block.
133.	Residual strap.
134.	Armature hinge.
135.	Armature stop hinge.
136.	Armature trigger.
137.	Armature shaft.
138.	Armature assembly complete.
139.	Armature only.
141.	Latch only.
142.	Latch assembly complete.
143.	Brake contact (new style).
144.	Brake contact finger (new style).
145.	Brake contact finger support.
146.	Flexible connection for No. 144.
156.	Slot connection block bracket.
168.	Compound relay complete.
169.	Compound relay armature.
171.	Wire conduit.
172.	Wire conduit clamp with screws.
176.	Compound relay contact.
177.	Upper coil for compound relay.
178.	Lower coil for compound relay.
179.	Light relay complete.
180.	Hold clear relay complete.
181.	Hold clear and light relay base.
182.	Hold clear and light relay armature.
183.	Hold clear and light relay steel bracket.
184.	Hold clear and light relay brass bracket.
189.	Hold clear and light relay contact screw.
191.	Hold clear relay coil.
192.	Standard and duplex light relay coil.
193.	Duplex light relay base.
197.	Duplex light relay contact bracket.
198.	Duplex light relay armature.
199.	Duplex light relay complete.
265.	Cushion connecting link.

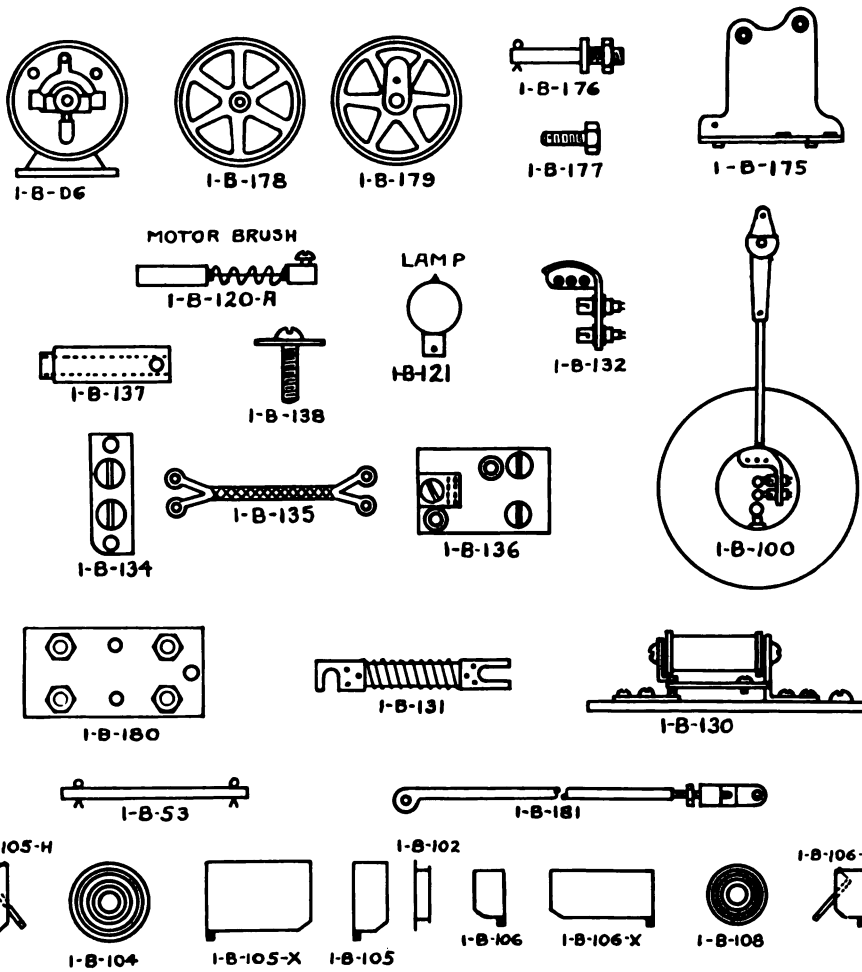
Also see page 23 for motor brushes

Repair Parts List for Alternating Current Signal Furnished on Request

Digitized by Google

Model 1-B Autoflag

MOTOR-DRIVEN—REPAIR PARTS



No.	Description
1-B- 5.	Banner hanger casting.
1-B- 6.	Banner hanger cover casting.
1-B-D6.	Motor (specify voltage).
1-B- 53.	Banner socket shaft.
1-B-100.	Banner, complete as shown (specify voltage).
1-B-102.	6¾″ to 5¾″ lens reducer.
1-B-104.	6¾″ red lens.
1-B-105.	Standard 6⅜″ lens hood, 3″ long. Dwg. No. 122.
1-B-105-H.	Hinged type 6⅜″ lens hood.
1-B-105-X.	Extra long 6⅜″ lens hood, 8″ long.
1-B-106.	Standard 5¾″ lens hood, 3″ long.
1-B-106-H.	Hinged type, 5¾″ lens hood. Dwg. No. 123.
1-B-106-X.	Extra long 5¾″ lens hood, 8″ long.
1-B-108.	5¾″ red lens.
1-B-120-A.	Brush for 6 volt D. C. motor.
1-B-121.	6-8 volt 2 c. p. bayonet base lamp.

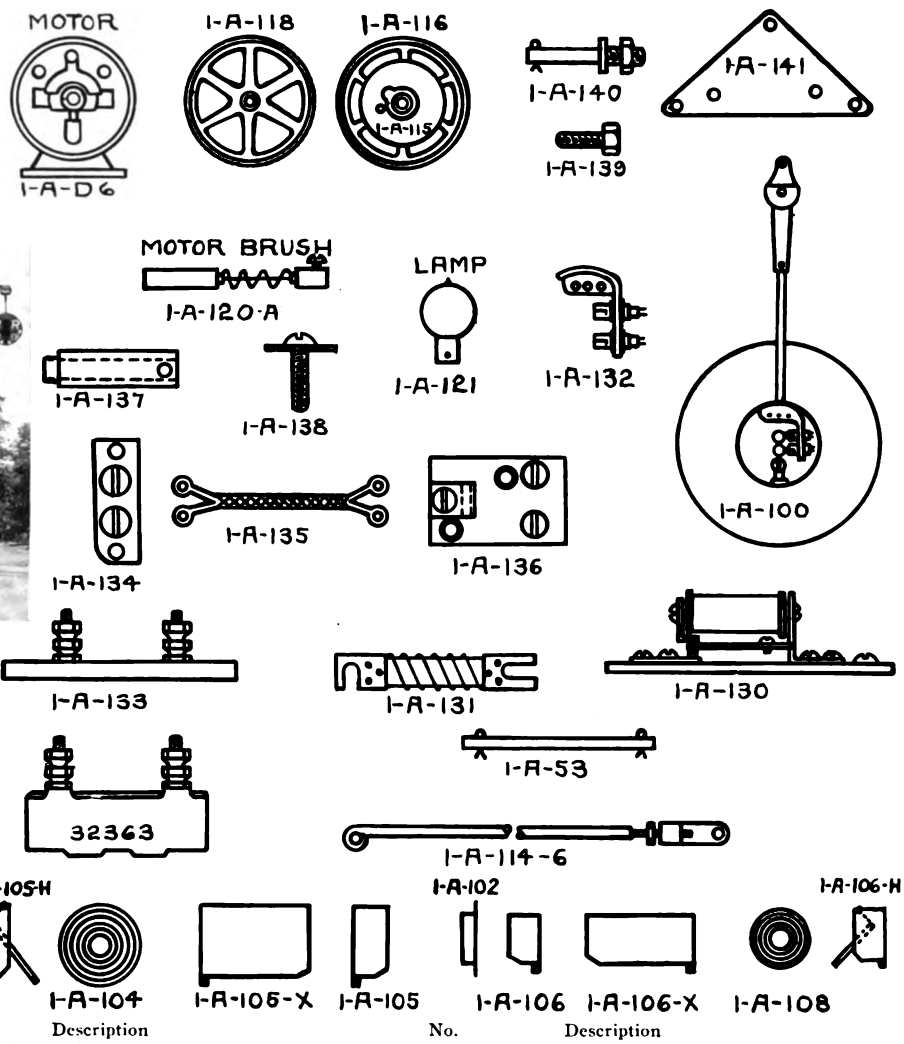
No.	Description
1-B-122.	Motor pinion.
1-B-130.	Light relay. Dwg. No. 559.
1-B-131.	Lamp resistance unit.
1-B-132.	Lamp bracket, complete with sockets. (See also No. 125-5 page 17.)
1-B-134.	Arm connection block.
1-B-135.	Flexible connection.
1-B-136.	Banner connection block.
1-B-137.	Motor brush sleeve.
1-B-138.	Motor base screw.
1-B-175.	Gear frame, complete with studs.
1-B-176.	Stud for drive or intermediate gear.
1-B-177.	Gear frame cap screw.
1-B-178.	Intermediate gear and pinion.
1-B-179.	Drive gear.
1-B-180.	Terminal block.
1-B-181.	Drive rod, complete for 6 foot arm.

Also see page 23 for motor brushes

Digitized by Google

Model 1-A Autoflag

REPAIR PARTS



No.	Description
1-A- 5.	Banner hanger casting.
1-A- 6.	Banner hanger cover casting.
1-A-D6.	Motor (specify voltage).
1-A- 53.	Banner socket shaft.
1-A-100.	Banner, complete as shown (specify voltage).
1-A-102.	6¾″ to 5⅜″ lens reducer.
1-A-104.	6¾″ red lens.
1-A-105.	Standard 6¾″ lens hood, 3″ long. Dwg. No. 122.
1-A-105-H.	Hinged type 6¾″ lens hood. Dwg. No. 123.
1-A-105-X.	Extra long 6¾″ lens hood, 8″ long.
1-A-106.	Standard 5⅜″ lens hood, 3″ long.
1-A-106-H.	Hinged type 5⅜″ lens hood.
1-A-106-X.	Extra long 5⅜″ lens hood, 8″ long.
1-A-108.	5⅜″ red lens.
1-A-114-6.	Standard drive rod for 6 foot arm.
1-A-115.	Drive plate complete with pin.
1-A-116.	Drive gear only.
1-A-118.	Intermediate gear and pinion.
1-A-120-A.	Brush for 6 volt D. C. motor.
1-A-121.	6 to 8 volt 2 c. p. bayonet base lamp.
1-A-122.	Motor pinion.
1-A-130.	Light relay. Dwg. No. 559.
1-A-131.	Lamp resistance unit.
1-A-132.	Lamp bracket, complete with sockets. (See also No. 125-5, page 17.)
1-A-133.	Main terminal block.
1-A-134.	Arm connection block.
1-A-135.	Flexible connection.
1-A-136.	Banner connection block.
1-A-137.	Motor brush sleeve.
1-A-138.	Motor base screw.
1-A-139.	Gear plate cap screw.
1-A-140.	Stud for drive or intermediate gear.
1-A-141.	Gear plate, complete with studs.
32363.	Light resistance terminal block.

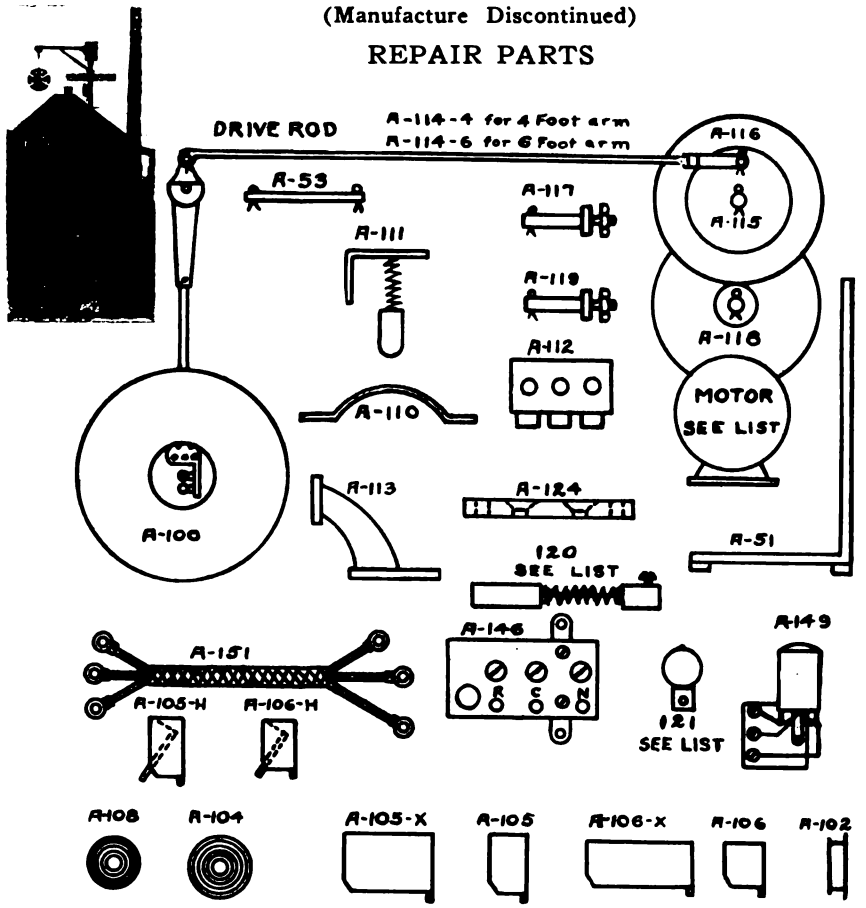
Also see page 23 for motor brushes

Digitized by Google

Model 1 Autoflag

(Manufacture Discontinued)

REPAIR PARTS



No.	Description
A- 5.	Banner hanger casting.
A- 6.	Banner hanger cover casting.
A- 51.	Gear frame.
A- 53.	Banner socket shaft.
A-100.	Banner complete as shown (specify voltage).
A-102.	6⅜" to 5⅜" lens reducer.
A-104.	6⅜" red lens.
A-105.	Standard 6⅜" lens hood, 3" long. Drg. No. 122.
A-105-H.	Hinged type 6⅜" lens rood. Drg. No. 123.
A-105-X.	Extra long 6⅜" lens hood, 8" long.
A-106.	Standard 5⅜" lens hood, 3" long.
A-106-H.	Hinged type 5⅜" lens hood.
A-106-X.	Extra long 5⅜" lens hood, 8" long.
A-108.	5⅜" red lens.
A-110.	Sliding contact strip for banner lights.
A-111.	Contact pin and spring for banner lights.
A-112.	Contact pin insulating block.
A-113.	Bracket for insulating block.
A-114-4.	Drive rod for 4 foot arm.
A-114-6.	Drive rod for 6 foot arm.

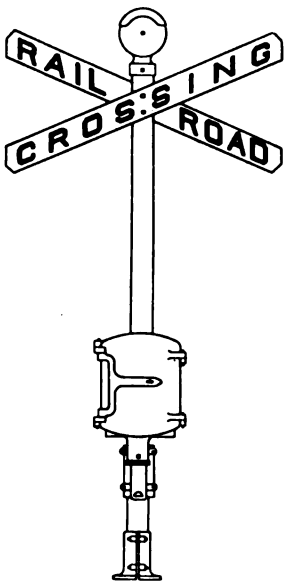
No.	Description
A-115.	Drive plate complete with pin.
A-116.	Drive gear only.
A-117.	Drive gear stud.
A-118.	Intermediate gear and pinion.
A-119.	Intermediate gear stud.
A-120-A.	Brush for 6 volt D. C. motor.
A-120-B.	Brush for 110 volt D. C. motor.
A-120-C.	Brush for 110 volt A. C. motor.
A-121-A.	6 volt 2 c. p. bayonet base lamp.
A-121-B.	10 volt 2 c. p. bayonet base lamp.
A-121-C.	6 volt 2 c. p. miniature screw base lamp (special).
A-121-D.	12 volt 2 c. p. Edison screw base lamp (special).
A-122.	Motor pinion.
A-124.	Fibre base for sliding contact strip.
A-146.	Terminal block for flexible connection.
A-149.	Reserve light relay. Drg. No. 559.
A-151.	Flexible connection.
A-D- 6.	6 volt direct current motor.
A-D- 10.	10 volt direct current motor.
A-D-110.	110 volt direct current motor.
A-A-110.	110 volt 60 cycle alternating current motor.

Also see page 23 for motor brushes

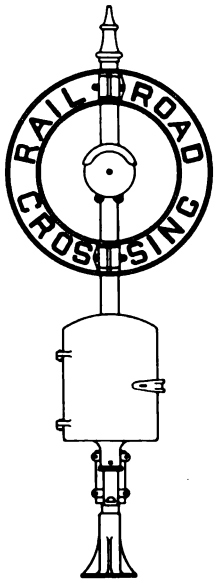
Digitized by Google

Highway Crossing Signals

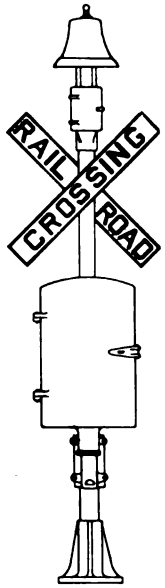
POPULAR ASSEMBLIES



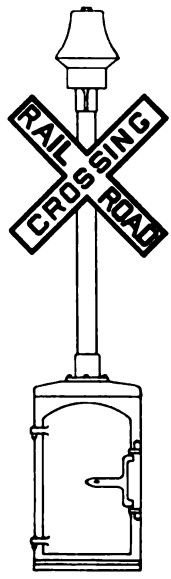
No. 53301



No. 53302



No. 53304



No. 53305

The four signals above illustrated are found to be the most popular assemblies of the many which are installed. Variations of these assemblies and other signals can be furnished to meet the requirement of any location where an audible warning and crossing sign are desired. When ordering, specify voltage on which bells are to operate.

No. 53301. Highway crossing signal, consisting of:

No. 222C crossing bell, No. 705 crossing sign, No. 1704 cast iron, wood lined, relay box, No. 161 gooseneck bracket, 4″x12′ pipe post and No. 14492 cast iron foundation base.

No. 53302. Highway crossing signal consisting of:

No. 222A crossing bell, No. 31 crossing sign, No. 580C cast iron, wood lined, relay box, No. 161 gooseneck bracket, No. 1082 pinnacle, 4″x12′ pipe post and No. 874-20 cast iron foundation base.

No. 53304. Highway crossing signal consisting of:

No. 444 locomotive type bell, No. 3301 crossing sign, No. 1190A extra large cast iron, wood lined, relay box, No. 161 gooseneck bracket, 4″x12′ pipe post and No. 8 cast iron foundation base.

No. 53305. Highway crossing signal consisting of:

No. 990 locomotive type bell, No. 3304 crossing sign, No. 1023 base of mast relay and battery case and 4″x7′ pipe post.

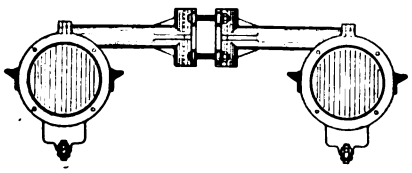
Digitized by Google

FLASHING LIGHT CROSSING SIGNALS
Showing use of Illuminated STOP Sign and standard methods of installation at dangerous crossings

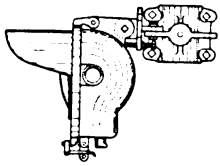
Digitized by Google

Highway Crossing Light Signals

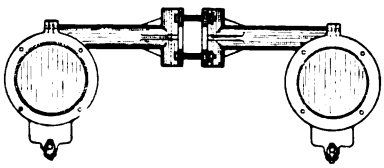
With Mangin Glass Reflectors



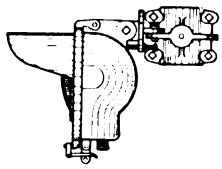
No. 814. Crossing Light Signal Unit
With Side Lights



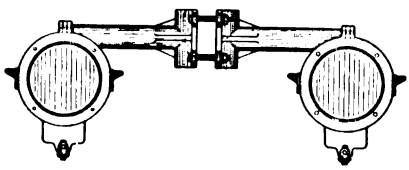
Side View



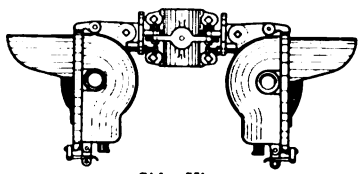
No. 815. Crossing Light Signal Unit
Without Side Lights



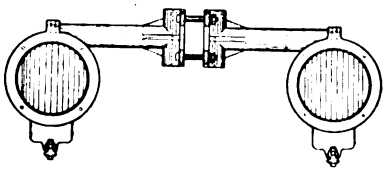
Side View



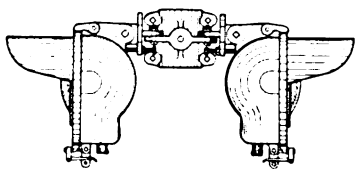
No. 816. Crossing Light Signal Unit
With Side Lights
(4 Lights on One Pole—Units Mounted Back-to-Back)



Side View



No. 817. Crossing Light Signal Unit
Without Side Lights
(4 Lights on One Pole—Units Mounted Back-to-Back)



Side View

Mounting Bracket

No. 805. Arm—fits 3 to 5-inch pipe.
No. 855. Arm—fits 3-inch pipe.
No. 856. Arm—fits 4-inch pipe.
No. 857. Arm—fits 5-inch pipe.

No. 807
Link

Side Light Hood

No. 810
Peep Light Hood

No. 811
Glass

Digitized by Google

Highway Crossing Light Signals

With Mangin Glass Reflectors

The No. 806 and No. 813 Crossing Light Signal Lamp Units shown and described on page 37 can be furnished for mounting in the four styles illustrated on the opposite page. No. 805 arms and bolts are furnished to fit 3″ to 5″ pipe posts, unless definite size or number is specified.

When ordering from the specifications below, specify the type of socket, the voltage and wattage of the lamp desired.

DESCRIPTION

No. 806. Crossing light signal lamp unit only, with peep lights, as described on page 37.

No. 813. Crossing light signal lamp unit only without peep lights, as described on page 37.

No. 814. Crossing light signal unit complete; consisting of two No. 806 lamp units, two No. 805 lamp arms (unless otherwise specified), two No. 807 links, bolts and nuts.

No. 815. Crossing light signal unit complete; consisting of two No. 813 lamp units, two No. 805 lamp arms (unless otherwise specified), two No. 807 links, bolts and nuts.

No. 816. Crossing light signal unit complete; consisting of four No. 806 lamp units, two No. 805 lamp arms (unless otherwise specified), four No. 807 links, bolts and nuts.

No. 817. Crossing light signal unit complete; consisting of four No. 813 lamp units, two No. 805 lamp arms (unless otherwise specified), four No. 807 links, bolts and nuts.

No. 805. Mounting arm for 3″ to 5″ pipe post.

No. 855. Mounting arm for 3″ pipe post.

No. 856. Mounting arm for 4″ pipe post.

No. 857. Mounting arm for 5″ pipe post.

No. 807. Suspension link.

No. 810. Peep light hoods only.

No. 811. Glass disc for peep light hoods.

No. CL-16. Lamp bulb (specify type of base, voltage and wattage).

No. CL-17. Convex, 8⅜″ red "spread-lite" roundel, 30 degree spread.

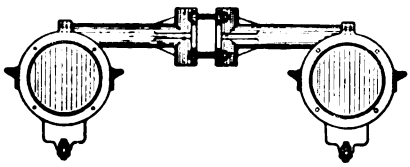
Other roundels furnished to specification.

For lamp unit parts, see page 37.

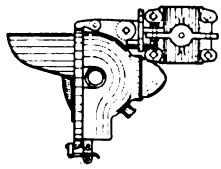
Digitized by Google

Highway Crossing Light Signals

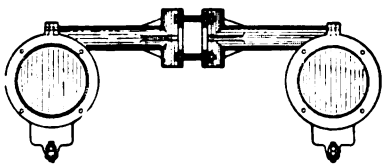
With Parabolic Glass Reflectors



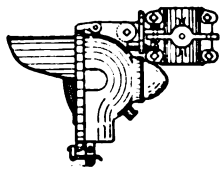
No. 884. Crossing Light Signal Unit
With Side Lights



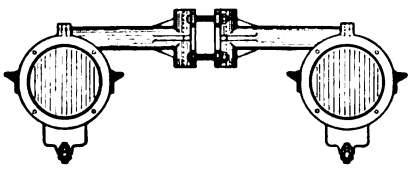
Side View



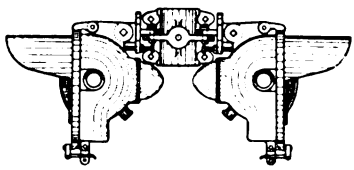
No. 885. Crossing Light Signal Unit
Without Side Lights



Side View

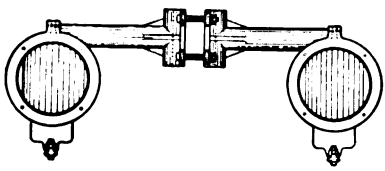


No. 886. Crossing Light Signal Unit
With Side Lights

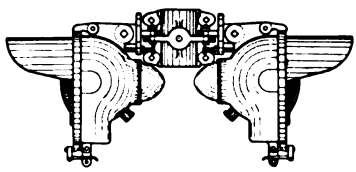


Side View

(4 Lights on One Pole—Units Mounted Back-to-Back)



No. 887. Crossing Light Signal Unit
Without Side Lights



Side View

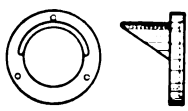
(4 Lights on One Pole—Units Mounted Back-to-Back)

Mounting Bracket

No. 805. Arm—fits 3 to 5-inch pipe.
No. 855. Arm—fits 3-inch pipe.
No. 856. Arm—fits 4-inch pipe.
No. 857. Arm—fits 5-inch pipe.

No. 807
Link

Side Light Hood



No. 810
Peep Light Hood

No. 811
Glass

Digitized by Google

Highway Crossing Light Signals

With Parabolic Glass Reflectors

The No. 808 and No. 818 Crossing Light Signal Lamp Units shown and described on page 38 can be furnished for mounting in the four styles illustrated on the opposite page. No. 805 arms and bolts are furnished to fit 3″ to 5″ pipe posts, unless definite size or number is specified.

When ordering from the specifications below, specify the type of socket, the voltage and wattage of the lamp desired.

DESCRIPTION

No. 808. Crossing light signal lamp unit only without peep lights, as described on page 38.

No. 818. Crossing light signal lamp unit only, with peep lights, as described on page 38.

No. 884. Crossing light signal unit complete; consisting of two No. 818 lamp units, two No. 805 lamp arms (unless otherwise specified), two No. 807 links, bolts and nuts.

No. 885. Crossing light signal unit complete; consisting of two No. 808 lamp units, two No. 805 lamp arms (unless otherwise specified), two No. 807 links, bolts and nuts.

No. 886. Crossing light signal unit complete; consisting of four No. 818 lamp units, two No. 805 lamp arms (unless otherwise specified), four No. 807 links, bolts and nuts.

No. 887. Crossing light signal unit complete; consisting of four No. 808 lamp units, two No. 805 lamp arms (unless otherwise specified), four No. 807 links, bolts and nuts.

No. 805. Mounting arm for 3″ to 5″ pipe post.

No. 855. Mounting arm for 3″ pipe post.

No. 856. Mounting arm for 4″ pipe post.

No. 857. Mounting arm for 5″ pipe post.

No. 807. Suspension link.

No. 810. Peep light hoods only.

No. 811. Glass disc for peep light hoods.

No. CL-16. Lamp bulb, specify type of base, voltage and wattage.

No. CL-17. Convex, 8¾″ red "spread-lite" roundel, 30 degree spread.

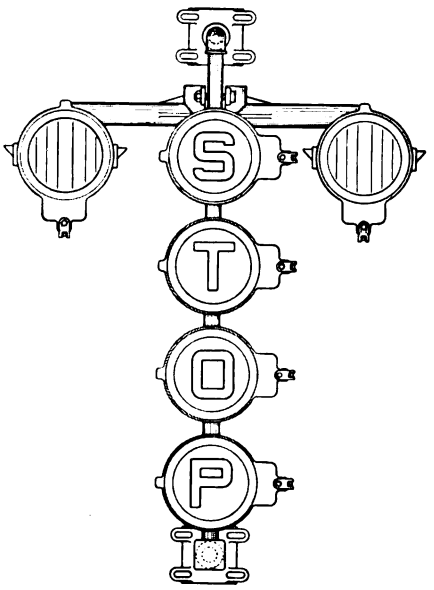
Other roundels furnished to specification.

For lamp unit parts, see page 38.

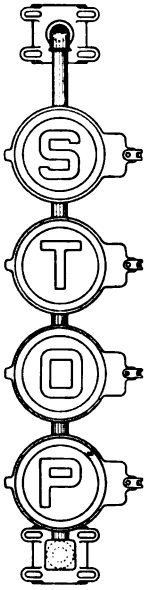
Digitized by Google

Crossing Light Stop Signal Units

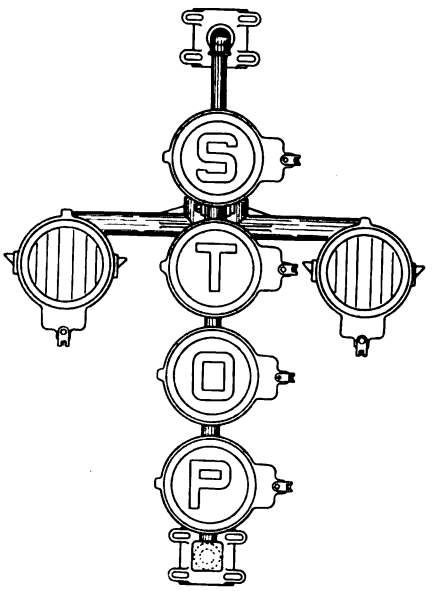
The STOP is Visible Only When Illuminated



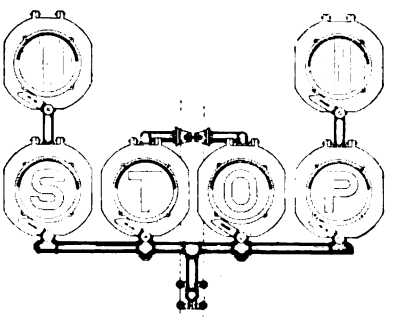
No. 888



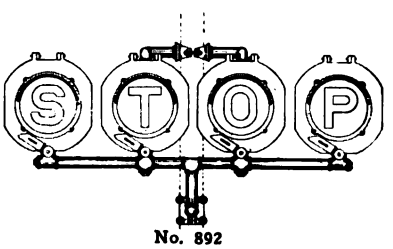
No. 889



No. 890



No. 891



No. 892

Digitized by Google

Crossing Light Stop Signal Units

The Crossing Light Stop Signal Units illustrated on the opposite page provide a very distinctive "STOP" indication to be erected alone or in connection with Standard Flashing Lights. The word "STOP" on these units is only visible when illuminated.

Two distinct types are provided. The vertical type is a very narrow signal, while the horizontal type is wider but can be placed farther above the ground.

The No. 889 can be added to existing flashing light signals without difficulty.

In ordering these units, which are furnished for mounting on 3" to 5" pipe posts, it is necessary to specify the style of socket, voltage and wattage of the lamps.

DESCRIPTION

No. 888. Crossing Light Signal Unit with vertical "STOP" and flashing lights complete with mounting brackets and bolts.

No. 889. Vertical "STOP" unit only with mounting brackets and bolts.

No. 890. Crossing Light Signal Unit with vertical "STOP" and flashing lights complete with mounting brackets and bolts.

No. 891. Crossing Light Signal Unit with horizontal "STOP" and flashing lights complete with mounting brackets and bolts.

No. 892. Horizontal "STOP" unit only with mounting bracket and bolts.

No. CL-16. Lamp bulb, specify type of base, voltage and wattage.

No. CL-17. Convex, 8⅛" red "spread-lite" roundel, 30 degree spread.

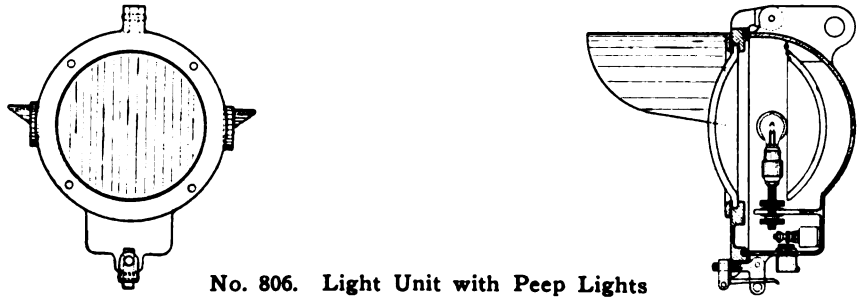
No. CL-23. Lettered glass discs for stop lights (specify "S" "T" "O" or "P" as required).

See pages 37 and 39 for parts for lamp units.

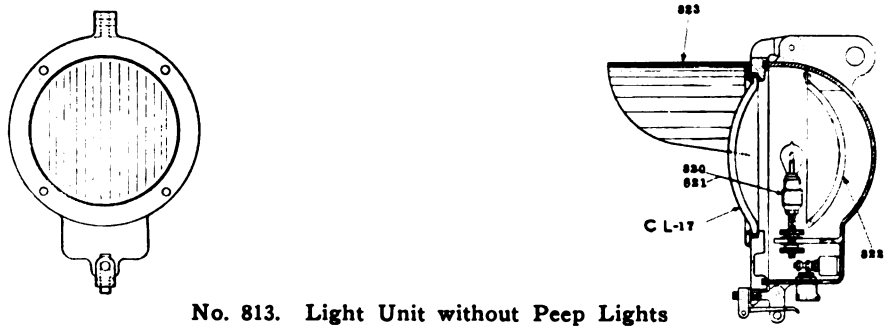
Digitized by Google

Highway Crossing Light Signal Units

WITH MANGIN GLASS REFLECTORS



No. 806. Light Unit with Peep Lights



No. 813. Light Unit without Peep Lights

In these Light Units, use is made of the remarkable reflecting qualities of the "Mangin" Glass Reflector which permits of the use of comparatively low wattage lamps.

The lamp socket is of the Non-Grounding type mounted before the reflector on a specially constructed Pedestal Lamp Adjuster which permits of easy focusing of the lamp filament with relation to the reflector. Medium screw base sockets can be mounted in the same manner when it is desired to use commercial power for the signals. All inspection and adjustment may be made from the front of the lamp, greatly facilitating such operations.

Convex, 8⅜" Red "Spread-lite" roundels are used having 30 degree spread which gives a beam 90 feet wide at 300 feet.

The No. 806 Light Unit is provided with peep lights on the sides of the lamps which are directly in line with the lamp filament. These emit white light enabling enginemen of approaching trains to see whether or not the Flashing Light Signals are operating.

The No. 813 Light Unit is identical, except that the peep lights are omitted.

On pages 31 and 32 will be found references, details and descriptions of various methods of using these lamp units in Flashing Light Crossing Signals.

Below are listed the parts which may be required for repairs.

PARTS DESCRIPTION

No. CL-16. Lamp bulb (specify type of base, voltage and wattage).

No. CL-17. Convex; 8⅜" red "spread-lite" roundel, 30 degree spread unless otherwise specified.

No. 820. Lamp socket, Non-grounding, single contact, bayonet base.

No. 821. Lamp socket, medium screw base.

No. 822. "Mangin" glass reflector.

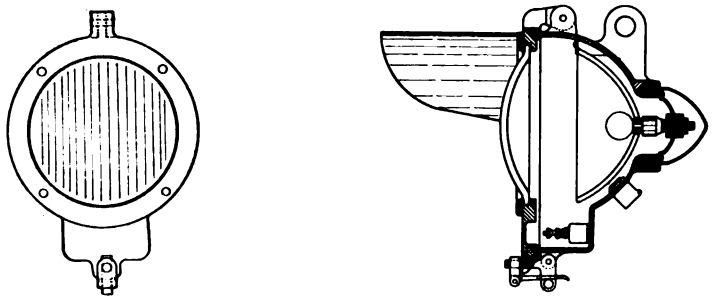
No. 823. Visor or hood.

See pages 31 and 32 for other parts.

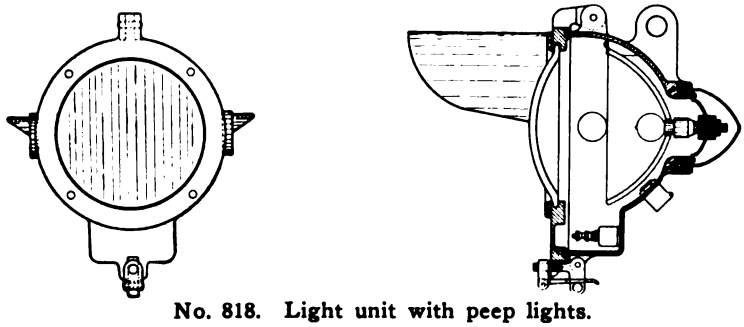
Digitized by Google

Highway Crossing Light Signal Units

With Parabolic Glass Reflectors



No. 808. Light unit without peep lights.



No. 818. Light unit with peep lights.

Parabolic glass reflectors of the finest quality are used in these lamps. These, together with an ingenious focusing device, permit the use of low wattage, standard commercial, single contact, bayonet base lamps. The adjusting nuts are accessible by removing the brass cap at the back of the lamp body. No. 818 has side or peep lights which enable enginemen of approaching trains to ascertain if the Flashing Lights are in operation. No. 808 is identical, except without the side lights.

Our Non-Grounding sockets are used for all single contact, bayonet base lamps and the focusing device has range sufficient to compensate for all variations of filament locations in commercial lamps of the S-11 bulb type.

When it is desired to use commercial power for this type of lamp, we furnish medium screw base sockets and recommend mill type medium screw base lamps or street railway headlight lamps, which have a highly concentrated filament.

Eight and three-eighths inch (8⅜") convex, Red "Spread-lite" roundels are used, unless otherwise specified, which give a beam 90 feet wide at 300 feet from the signal. Adjustments are provided for alignment of the light beam to meet local conditions.

On pages 33 and 34 are shown four standard Flashing Light Crossing Signal Units, using the lamps.

Below are listed parts which may be needed for replacement.

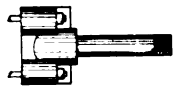
PARTS DESCRIPTION

No. CL-16. Lamp bulb (specify type of base, voltage and wattage).
No. CL-17. Convex, 8⅜" red "spread-lite" roundel, 30 degree spread unless otherwise specified.
No. 820. Lamp socket, Non-grounding, single contact, bayonet base.
No. 821. Lamp socket, medium screw base.
No. 832. Parabolic glass reflector.
No. 823. Visor or hood.

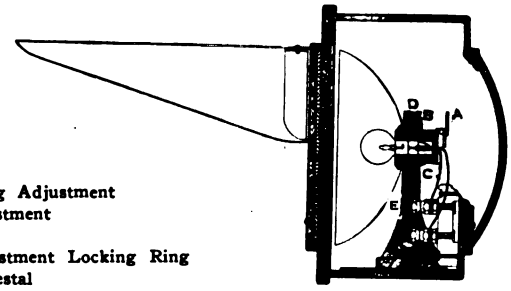
See pages 33 and 34 for other parts.

Digitized by Google

Highway Crossing Light Signal Units

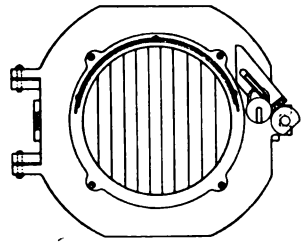


No. 703A
Mounting Arm

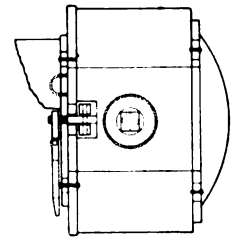


A—Lamp Focusing Adjustment
B—Reflector Adjustment
C—Socket Holder
D—Reflector Adjustment Locking Ring
E—Mounting Pedestal

Sectional View CL-10 Light Unit



Front View



Side View

THE CL-10 LIGHT UNIT

In the design of this Light Unit very careful consideration has been given to Reflector, Lamps, Lenses, Adjustments, etc., bearing in mind the necessity of securing maximum efficiency and ease of maintenance.

The housing is Cast Iron with front hinged and back removable to permit of easy access to all parts for adjustment and inspection.

The parabolic reflector, which may be either metal or glass as specified, and its mounting is arranged to secure a reasonable degree of adjustment of light rays without altering the position of the lamp housing.

A screw arrangement is provided for longitudinal adjustment of the lamp bulb, insuring accurate and positive means of focusing the lamp filament with relation to the reflector. Any type of socket and lamp can be furnished to specification, but unless otherwise specified, single contact bayonet base sockets and lamps will be furnished.

Red, convex, 8⅜" "spread-lite" roundels with 30 degree spread are furnished unless otherwise specified. These provide a beam 90 feet wide at 300 feet.

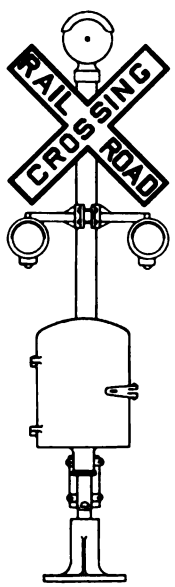
PARTS DESCRIPTION

No. CL-16. Lamp bulb, specify wattage, voltage and style of base.
No. CL-17. Convex, 8⅜" red "spread-lite" roundel, 30 degree spread unless otherwise specified.
No. CL-18. Visor or hood.
No. CL-19. Parabolic glass reflector.
No. CL-20. Parabolic metal reflector.
No. CL-22. Lamp socket, single contact bayonet base, unless otherwise specified.
No. 703A. Mounting arm, complete with bolts for 3" to 5" pipe post.

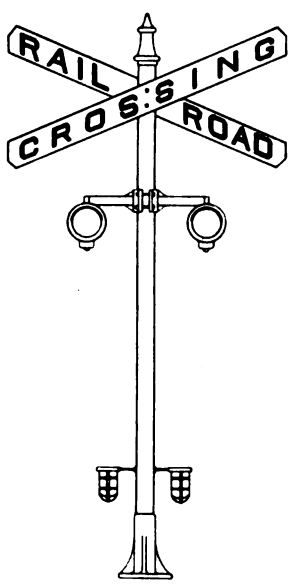
Digitized by Google

Flashing Light Crossing Signals

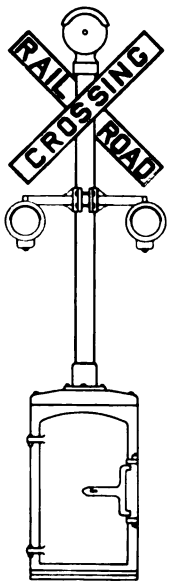
POPULAR ASSEMBLIES



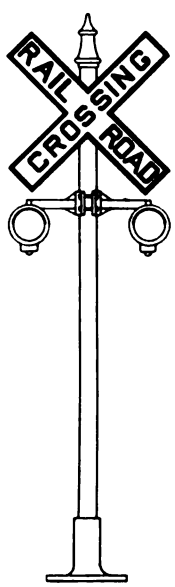
No. 53310



No. 53311



No. 53312



No. 53313

The flashing light crossing signals shown here are standard and popular designs applicable in many installations. Variations of these assemblies, such as leaving off the relay box or adopting a different sign or bell can often be used to advantage. Other signals will, of course, be made up from standard or special parts to meet requirements of any contemplated installation.

In ordering, always specify the operating voltage.

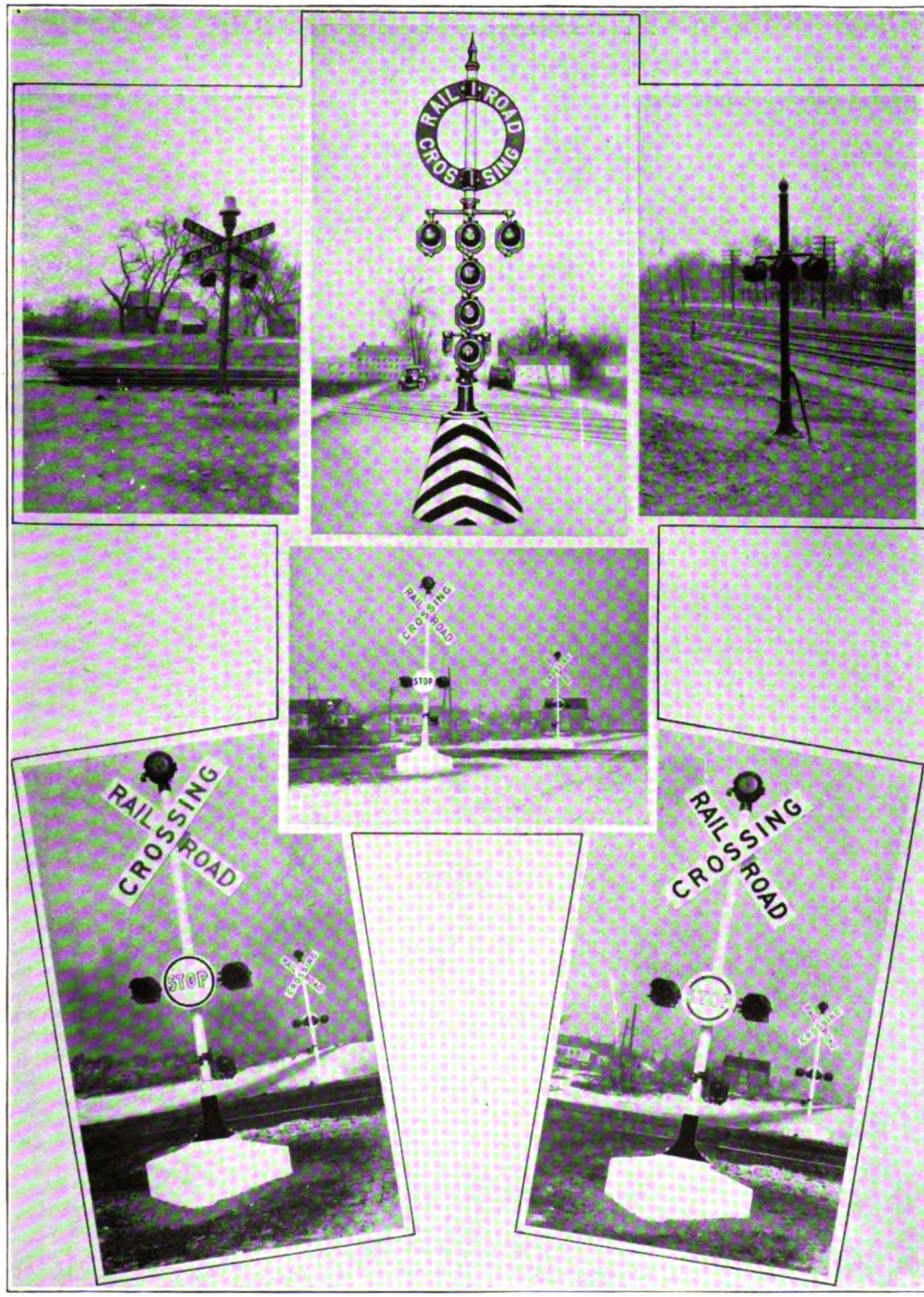
No. 53310. Flashing Light Highway Crossing Signal consisting of:
No. 222C crossing bell, No. 3304 crossing sign, No. 815 flashing light signal unit, No. 580C cast iron, wood lined relay box, No. 161 gooseneck bracket, 4″x12′ pipe post and No. 8 cast iron foundation base.

No. 53311. Flashing Light Highway Crossing Signal consisting of:
No. 1082 pinnacle, No. 705 crossing sign, No. 815 flashing light signal unit, two No. 675 pilot lights, 4″x12′ pipe post and No. 874-20 cast iron foundation base.

No. 53312. Flashing Light Highway Crossing Signal consisting of:
No. D-51 crossing bell, No. 3301 crossing sign, No. 815 flashing light signal unit, No. 1023 base of mast battery and relay case and 4″x7′ pipe post.

No. 53313. Flashing Light Highway Crossing Signal consisting of:
No. 1082 pinnacle, No. 3304 crossing sign, No. 815 flashing light signal unit, 4″x12′ pipe post and No. 44 cast iron foundation base.

Digitized by Google

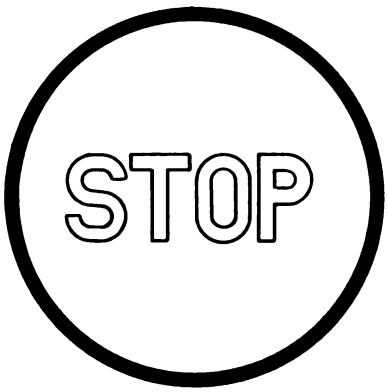


CROSSING LIGHT SIGNALS IN SERVICE
Showing Standard Methods of Installation

Digitized by Google

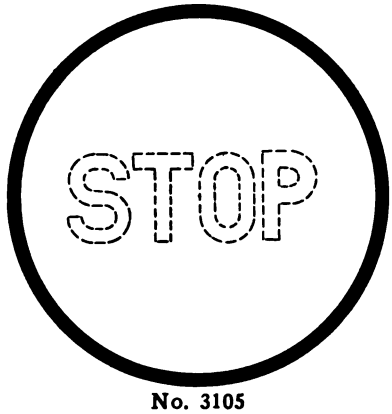
Illuminated Signs

"STOP"

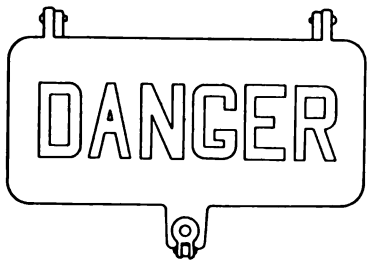


No. 3100
Letters Always Visible

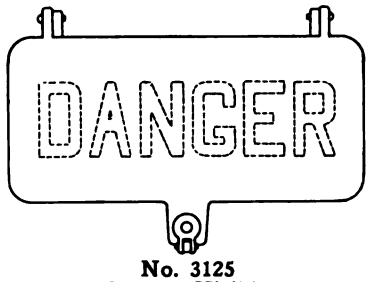
"DANGER"



No. 3105
Letters Visible
Only When Illuminated



No. 3120
Letters Always Visible



No. 3125
Letters Visible
Only When Illuminated

Illuminated stop and danger signs of this type provide efficient and desirable markers for crossings where local ordinance or state law require signs of this character. The letters of the No. 3100 and No. 3120 signs are outlined in black on a white background and are visible in daylight because of this. Low candle power, efficient lamps set behind the letters illuminate the words for night indication.

The letters of signs No. 3105 and No. 3125 are not visible except when illuminated and high candle power lamps and reflectors behind the letters produce sufficient light for both day and night indication.

Unless otherwise specified, white translucent glass will be furnished on signs No. 3100 and No. 3120 and red glass on signs No. 3105 and No. 3125. Sockets and lamps to specification will be furnished, although single contact bayonet base types are considered standard.

"U" bolts for mounting on 3″ to 5″ pipe posts, as specified, are furnished.

Arrangement can be made for mounting No. CL-10 lamps on the lamp cases of these signs when specified. (See page 39.)

No. 3100. Illuminated stop sign, complete with 2 single contact bayonet base lamps and non-grounding sockets mounted on pedestal lamp adjuster (specify voltage).

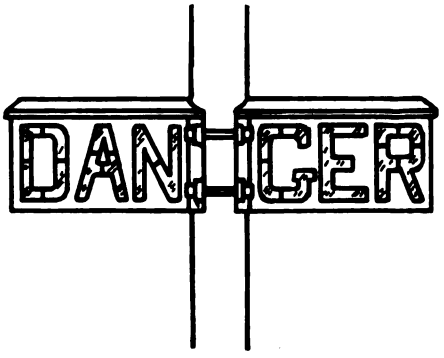
No. 3120. Illuminated danger sign, complete with 3 single contact bayonet base lamps and non-grounding sockets mounted on pedestal lamp adjuster (specify voltage).

No. 3105. Illuminated stop sign, complete with 4 single contact bayonet base lamps, sockets and reflectors (specify voltage).

No. 3125. Illuminated danger sign, complete with 6 single contact bayonet base lamps, sockets and reflectors (specify voltage).

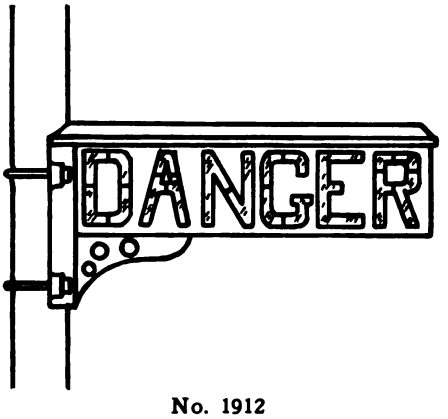
Digitized by Google

Illuminated Danger Signs



No. 1909

Furnished for use on any specified voltage from 3½ to 220 volts.



No. 1912

The Illuminated Danger Signs shown above are intended for use where a visual indication is required at night as well as by day.

These signs are furnished complete with ruby glass, sockets and lamps completely wired. They can be furnished for any specified voltage from 3½ to 220 volts.

Access to the lamps is readily gained by removing the cover which is securely fastened with machine screws.

When used in connection with a crossing bell, the current can be taken from the same source. In this connection the sign lights can also be made to flash, by the use of a contact applied to the bell, which makes the warning doubly arrestive to the eye.

These signs are so designed that they can be applied to any size pole from 2½" to 5" in diameter.

When ordering, specify voltage.

No. 1909. Illuminated sign complete (two-piece type).

No. 1911. Heavy ribbed-wire glass, four required. 7¼"x14⅝".

No. 1912. Illuminated sign complete (bracket type).

No. 1913. Heavy ribbed-wire glass, two required. 7½"x29½".

Digitized by Google

Pedestal Lamp Adjuster
and
Quick-Set Focusing Device

For Oil Lamp Bodies

No. 1801. Pedestal Lamp Adjuster

No. 1802. Quick-Set Focusing Device

Where nearly new oil lamps become obsolete because of the desire to use electrical illumination for semaphore signals, it is economical to use the oil lamp housings as long as they are serviceable and discard only the founts.

For this purpose we have designed the two styles of focusing devices illustrated above, which incorporate our famous Non-Grounding socket described on the opposite page, to mount in the oil lamp case in place of the fount.

The focusing of the lamp, with relation to the lens, is easily accomplished with either type of adjusting device. The adjustments are sufficient in every direction to compensate for the irregularities in filament location of commercial lamps of the S-11 type with single contact, bayonet bases.

The adjusters may be removed from the bases and mounted in the A. R. A. cast iron lamp case or our No. 1804 lamp case, described on succeeding pages, after the oil lamp housings have become useless. This additional economy feature is worthy of consideration.

In ordering, specify A. R. A. oil lamp bodies, if used and height and size of founts if other lamp bodies are to be used.

Description

No. 1801. Pedestal lamp adjuster complete with base and terminal block for use in oil lamp bodies.

No. 1802. Quick-set focusing device complete with base and terminal block for use in oil lamp bodies.

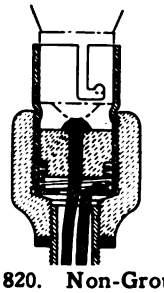
Digitized by Google

Non-Grounding Signal Socket
and
Pedestal Lamp Adjuster

THE NON-GROUNDING SIGNAL SOCKET

The Non-Grounding Signal Socket is of superior design and construction. It is specially made for signal service to eliminate the troubles so frequently experienced when sockets are used which were primarily designed for automobile lighting.

From the cross section drawing of the socket it will be seen that the socket can in no way become grounded to its support. The shell of the socket and the plug which carries the center contact are machined from "Formica" rod. These parts will not shrink, warp or become distorted as do many such parts which are made from hard rubber or moulded compositions.



No. 820. Non-Grounding Socket

It should be noticed that two rubber covered, braided, stranded copper wires are brought out for connections.

The socket is made to take the single contact, bayonet base lamps recommended by the A. R. A. Signal Section.

It is used on the lamp adjuster shown in the A. R. A. Lamp Body and on the Pedestal Lamp Adjuster described below as well as in our "Autoflag" signals and other illuminated devices where single contact, bayonet base lamps are used.

No. 820. Non-Grounding Lamp Socket complete for ⅛" pipe thread (specify length of leads).

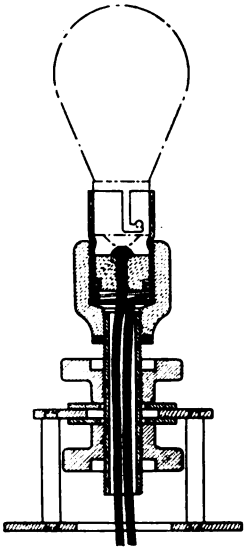
THE PEDESTAL LAMP ADJUSTER

This Adjuster, with the Non-Grounding Socket, permits the use of standard, commercial, single contact, bayonet base lamps in electric lighting of semaphore signals, switch lamps, etc. It may be used in the old oil lamp bodies or in the lamp bodies shown on succeeding pages, and in other forms of lamp housing where focusing of the lamp is required.

The focal adjustment has a range to cover all the variations common in commercial lamps with bulbs of the S-11 size. Adjustment is easily accomplished and becomes permanently locked when made.

The adjuster is of nickeled brass and the socket parts that are not of nickeled brass are of "Formica," thus making the fixture corrosion proof insuring extremely long life.

No. 1811. Pedestal lamp adjuster complete with leads (specify length).



No. 1811

Digitized by Google

Electric Semaphore Light

WITH PEDESTAL LAMP ADJUSTER FOR QUICK-SET FOCUSING DEVICE

A. R. A. Signal Section Drawing No. 1564

The Electric Semaphore Lamp Bodies made in accordance with A. R. A. Signal Section Drawing No. 1564 will be equipped as specified, with either the pedestal lamp adjuster or the Quick-Set Focusing Device. Any color lens will be furnished to specification. Either 5⅜" or 5" optical or "spread-lite" lenses are furnished as desired.

The focusing of the lamp with relation to the lens is readily accomplished by the use of cross hairs and peep sights built into the lamp body. This eliminates the costly rebased lamp and all portable focusing instruments. With these lamp bodies and either type of lamp adjuster, one man can quickly focus the lamp in the day time.

Any standard single contact bayonet base lamp of the S-11 bulb type can be used as our Non-Grounding Signal Socket is used and the adjusters have sufficient range to compensate for variations of filament location in commercial lamps.

All parts are jig machined, therefore, the replacement of a lens does not necessitate the re-focusing of the lamp.

No. 1520. Electric Semaphore Light with Pedestal Lamp Adjuster for single contact bayonet base lamps. (Give lamp specifications and color and size of lens.)

No. 1521. Electric Semaphore Light with Quick-Set Focusing Device for single contact bayonet base lamps. (Give lamp specifications and color and size of lens.)

Digitized by Google

Electric Semaphore Light

WITH REFLECTOR

A. R. A. Signal Section Drawing No. 1564

The most efficient lighting from low candle power lamps can be obtained by the use of the reflector type of lamp body such as No. 1522, illustrated above. The lamp case is constructed in accordance with A. R. A. Signal Section Drawing No. 1564 and the lamp socket is mounted in the reflector in such a way as to permit focusing of the lamp filament, in relation to the reflecting surface, to obtain the utmost in beam candle power from the light source available.

Clear, convex roundels are used unless lunar white, red, green or other color is specified. Single contact bayonet base lamps of the S-11 bulb type are used and can be furnished for any voltage from 3½ volts to 24 volts as specified.

The reflector is secured, by means of clips and a thumb screw, against a machined surface which insures perfect alignment of the reflector. No re-alignment of the lamp body is necessary after having replaced a burned out lamp, as the reflector must always assume its original position with relation to the lamp body when it is placed against the machined surface.

The back of the reflector is encased in a metal shell to protect the silvering against damage. The reflector, being of glass, may be repeatedly cleaned without impairing its efficiency as it is not easily scratched and does not tarnish as do the commonly used metal reflectors.

No. 1522. Electric Semaphore Light with reflector, for single contact bayonet base lamp. (Give lamp specifications and color of roundel.)

Digitized by Google

Electric Semaphore Lamp Body

WITH QUICK-SET FOCUSING DEVICE OR PEDESTAL LAMP ADJUSTER

No. 1813. With Quick-Set Focusing Device

Cover

No. 1823. With Pedestal Lamp Adjuster

This lamp body can be equipped with either the pedestal lamp adjuster or the quick-set focusing device as specified. The lamp adjusters are capable of sufficient adjustment to compensate for the filament variations of commercial lamps of the S-11 bulb type. The cross hairs and peep sights built into the lamp bodies permit of accurate focusing of the lamps with relation to the lens, thus securing the best efficiency from the light source available. This eliminates the costly rebased lamp and portable focusing instruments. With these bodies and either type of adjuster, one man can quickly focus the lamp in the daytime.

Our non-grounding signal socket is used which is made up from nickel plated brass parts to prevent corrosion and formica for insulation. These sockets are much more satisfactory and serviceable than sockets designed for automotive use and accommodate single contact bayonet base lamps.

All parts are jig machined; therefore, the replacement of a lens does not require re-focusing of the lamp.

Optical or "spread-lite" lenses of any color specified will be furnished and lamps for any voltage from 3½ volts to 24 volts will be furnished to specification.

No. 1813. Electric semaphore lamp body with quick-set focusing device (give lamp specifications and color and kind of lens).

No. 1823. Electric semaphore lamp body with pedestal lamp adjuster (give lamp specifications and color and kind of lens).

WITH RESERVE LIGHT RELAY

These lamp bodies with quick-set focusing device can also be furnished with two sockets spaced for S-11 bulb lamps and a reserve light relay. Current for the normal lamp, which is in focus, flows through the low resistance coil of the relay and holds the back contact open. In case the normal light burns out, the relay armature is released, closing the back contact, which lights up the reserve light, thus forestalling light failures.

It is recommended that the reserve light, which is not in focus, be of higher candle power to give sufficient light for a desirable indication which will prevent train stops.

Digitized by Google

No. 1815 Lamp Body

WITH GLASS REFLECTOR

To obtain the utmost in efficient electric lighting of semaphore signals, with low power lamps, the No. 1815 A. R. A. Lamp Body is recommended. It is similar in external appearance to those illustrated on the opposite page.

However, in the place of the optical lens, a clear, convex roundel is used in front of a silvered glass reflector. The lamp socket is mounted in the reflector in such a way as to permit focusing the lamp filament, in relation to the reflecting surface, to obtain the full value of the light produced.

The reflector is secured, by means of clips and a thumb screw, against a machined surface which insures perfect alignment of the reflector. No re-alignment of the lamp body is necessary after having replaced a burned out lamp, as the reflector must always assume its original position with relation to the lamp body when it is placed against the machined surface.

The back of the reflector is encased in a metal shell to protect the silvering against damage. The reflector, being of glass, may be repeatedly cleaned without impairing its efficiency as it is not easily scratched and does not tarnish as do the commonly used metal reflectors.

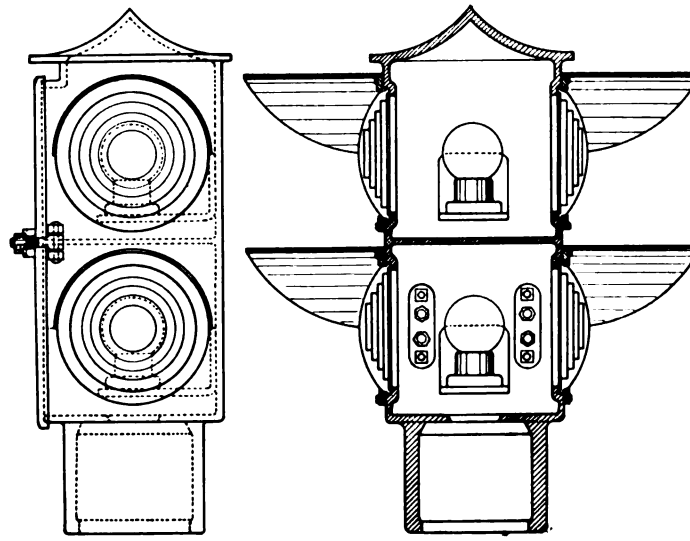
The lamp bodies can be furnished with clear, lunar white or colored roundels as specified. Lamps of any specified voltage from 3½ volts to 24 volts, will be furnished as required.

Unless otherwise specified, however, the lamp bodies will be furnished with clear glass convex roundels and sockets for single contact bayonet base lamps, but without the lamp bulbs.

No. 1815. Reflector Type Lamp Body, for single contact bayonet base lamps of the S-11 bulb type. (Give lamp specifications, if lamps are desired and color and kind of roundel.)

Digitized by Google

No. 850 Two Position Duplex Signal



This Two-Position Signal, showing light in both directions, will be found useful in many ways in connection with color light signaling, especially where commercial power or trolley current is to be used for the lights.

The case is of cast iron with a socket for 4" I.D. pipe post with door permitting access to the lamps. Medium screw base sockets (unless otherwise specified) are mounted between each pair of lenses so that mill type lamps or street railway head light lamps can be used to give excellent light indications both day and night. The filaments of these types of lamps are not sufficiently concentrated to require rebased lamps or adjustments, other than those made in the factory, to compensate for filament location variations.

These signals are well adapted to use by electric lines and others as station stop signals. At local stations, where trains stop only on signal, these signals, with suitable switch, can be installed in place of the older style semaphore types to indicate whether a passenger, who has manipulated the switch, is waiting to board a train or not. In this class of service it is the practice of some lines to use a steadily burning green light which indicates that no one is at the station to board the train and a lunar white lens, which, when lighted by the throwing of the switch, gives a two light indication, which cannot be confused with automatic signals, that a patron wishes the train to stop.

Normally open, self restoring, water tight switches are usually used to eliminate the necessity of the conductor crossing the platform to restore the signal to normal position when it has been set to stop the train.

While the most common use of this signal is for the station stop signal it can readily be seen that other uses will be found for it.

This signal can also be furnished showing light in but one direction and for use with low voltage lamps when specified.

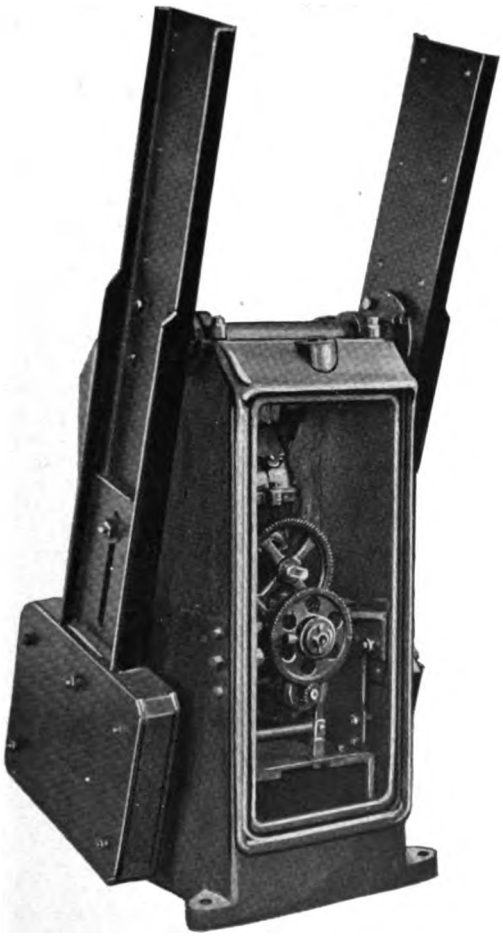
No. 850. Two position, two color light Duplex signal complete for mounting on 4" I.D. pipe post. (Give lamp specifications and colors of lenses desired.)

Digitized by Google

N-N Electric Crossing Gates

For protecting the public at railroad-highway grade crossings and at bridge approaches the electric crossing gate is rapidly taking the place of all other types.

With highway traffic constantly increasing in volume and speed, it is more important than ever before to have fast reliable gates at crossings; gates capable of standing up under most severe 24-hour service.



Assembled Gate Post Mechanism Front and Top Cover Removed

The N-N Electric Crossing Gate has been designed to meet the requirements of present-day usage.

Due to its rugged construction, this gate easily handles roadway arms up to 40 feet in length with an additional 18-foot sidewalk arm.

In order to have the fastest practical operation for varying lengths of roadway arms, it is furnished in four models; the chief difference being speed of operation.

See page 54 for data on these models.

A specially designed limit switch limits the gate's travel in each direction and may also handle gate warning signals, indication lights or interlocking circuits if desired.

Digitized by Google

N-N Electric Crossing Gate

DESCRIPTION

The operating mechanism consists of an electric motor, a train of spur gears, a worm gear reduction and a limit switch.

An adjustable steel connecting rod links a crank on the worm gear shaft to a crank on the roadway arm shaft and the sidewalk arm is in turn driven by linkage from the roadway arm.

The gate arm shafts are annealed steel castings carried in babbitted bearings in the case.

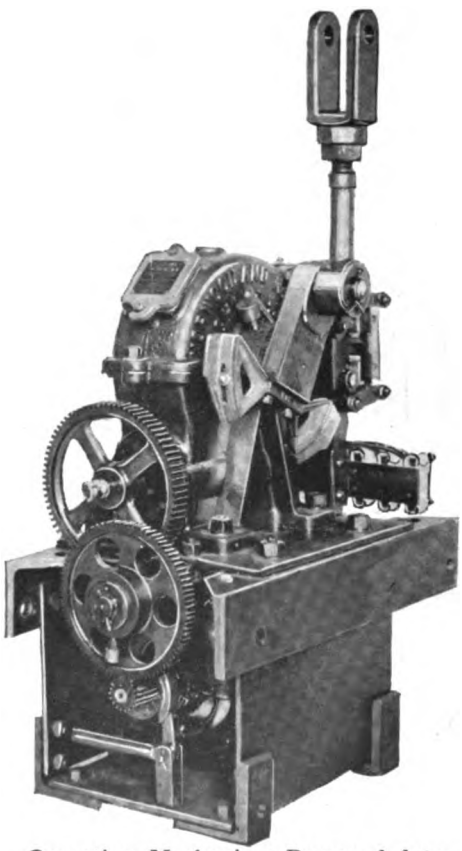
The case is of heavy cast iron and is made practically dust proof by gaskets around the openings. A large door on each side makes all parts of the operating mechanism accessible for inspection and adjustment.

The motor is mounted on the lower plate of the operating mechanism frame and may be removed independently.

If desired, an electric bell may be mounted on the gate cover, thereby saving the expense of an additional support.

Our No. 222C crossing bell, described on page 56, is recommended for use where gates are to operate from a Direct Current source and the No. 555C crossing bell described on page 62, for use with gates operated on Alternating Current. Gate housing can be equipped for using other types of bells described in the catalogue when desired.

Approximate weight of gate post crated for shipment, 1600 pounds.



Operating Mechanism Removed from Case. Note That It Is Removable as a Unit

Digitized by Google

N-N Electric Crossing Gate

DISTINCTIVE FEATURES OF THIS GATE

Ruggedness of design.

Speed of operation.

Accessibility of all working parts.

Operating mechanism removable as a unit.

Limit switch—fast breaking—handles services up to 500 volts D. C.

Lubrication—bearings not running in oil are provided with Alemite fittings or grease cups.

Model NN-13
Electric Crossing Gate
with 48-ft. Arm
and
75° Angle of Opening

Worm gear—entirely enclosed and fitted with ball thrust bearings.

Motor—heavy industrial—may be reversed by plugging at any intermediate position of gate arms.

Reversing drum controller, part of standard equipment.

Performance and low cost of maintenance makes the N-N Crossing Gate popular with every customer.

Digitized by Google

N-N Electric Crossing Gate

OPERATION

One-half revolution of the worm wheel crank operates the gate arms through their entire travel of either 90 or 75 degrees. With some installations 75 degrees is desirable where a vertical arm would interfere with wires overhead.

By having the worm crank turn through 180 degrees the gate arm is started and brought to rest with no undue shocks. This cushioning effect is so marked that only on the largest model has a buffer been found necessary to support the outer end of the arm.

The worm gear being the last reduction in the gear train, locks the arms in any position and takes the shock off the smaller high speed gears if the arms are reversed in mid-position.

The drum controllers furnished as standard equipment provide for perfect manipulation of the gate, allowing full movement of the arm, stopping in any position or reversal of the arm at any point.

A small mechanical brake on the motor shaft prevents the gate over-traveling after the limit switch breaks the motor circuit.

SPECIFICATIONS

Model	Operating Time	Motor	Max. Arm
N-N 7	7 Sec.	½ H.P.	18 ft.
N-N 9	9 Sec.	½ H.P.	30 ft.
N-N 11	11 Sec.	¾ H.P.	42 ft.
N-N 13	13 Sec.	¾ H.P.	50 ft.

WRITE FOR PRICES

Giving following information as to requirements:

A—Kind of service available for motors.
B—Length of roadway arm to be used.
C—Length of sidewalk arm, if any.
D—Whether 75 or 90-degree angle of travel is desired.
E—Are wooden arms to be furnished? See Note 1.
F—Are bell and bell mounting to be furnished?
G—What special circuits, if any, are required through limit switch?

Note 1. If wooden arms are to be constructed on the ground, we will furnish blue prints for, lengths specified, upon request.

Note 2. Repair parts list furnished on request. Give model number.

Digitized by Google

Section 2

Contents

HIGHWAY CROSSING BELLS
VIBRATING BELLS
BUZZERS
HAND TRIP GONGS

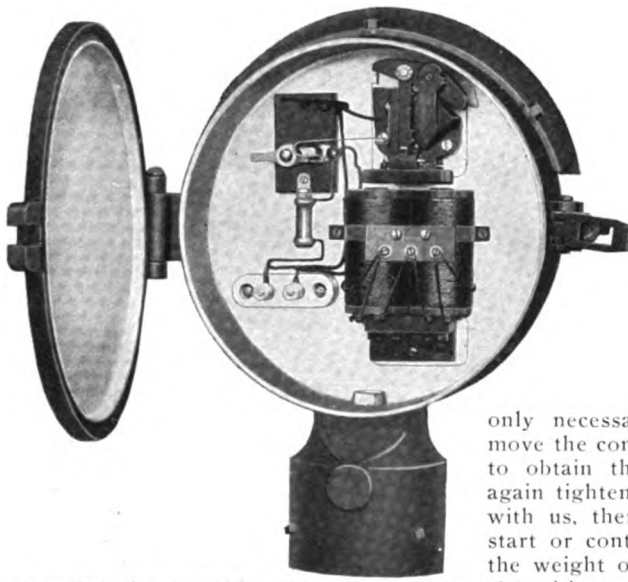
Digitized by Google

Highway Crossing Bell No. 222

GONG TYPE

Patented Dec. 15, 1914

For 6 to 600 Volts Direct Current



Simplicity—The movement in detail consists of a pair of magnets, an armature, an oscillator and hammer, a link connecting the armature and oscillator, and an adjustable circuit breaker. On the connecting link is mounted the movable contact. There is only one adjustment possible to make and that is the circuit breaker, where a $\frac{1}{16}$-inch break should be maintained. This adjustment is on the principle of a teeter and it is only necessary to loosen the set screw, move the contact finger support up or down to obtain the desired $\frac{1}{16}$-inch break, and again tighten the screw. Gravity is always with us, therefore no springs are used to start or control the operation of this bell, the weight of the hammer, due to gravity, returning the movable parts to their normal position.

Durability—The durability and wearing properties of this bell are due to the manner in which we protect the more sensitive parts of the movement from the terrific blows of the hammer throw. The moving parts are mounted on a heavy cast base, part of the casting consisting of two heavy anvils or stop blocks, so placed as to limit the forward and backward motion of the hammer, thus taking all the punishment, jar and vibration, and keeping it away from the armature and circuit breaker. The armature does not strike the magnets, merely moving back and forth in space and touching nothing. All wearing parts of the mechanism are made extra heavy and rugged, containing almost double the amount of material required, in order to prevent breakage and insure long life.

General Facts—The bell in its outward and general appearance and design is similar to other types we have produced and has proven eminently satisfactory. It is made so that it can be placed on the side or top of a post or pipe, and the case, gong and rain shield are so perfectly fitted as to make the mechanism absolutely bug, dust and weather proof. The gong is of steel, twelve inches in diameter, giving a loud, clear and penetrating sound, the hammer blows being so timed that one sound wave is not broken up by subsequent sound waves. This bell can be furnished to operate on any specified voltage from 6 to 600. However, unless otherwise specified, they are wound to 10 ohms resistance for use on 6 volt circuit.

A resistance is introduced in the circuit which absorbs all contact arc, greatly prolongs the contact life and eliminates interference with radio reception.

Accessibility—The hinged type case allows ready access to the mechanism so that inspection and adjustment can be made while bell is in operation. The bell case is made in four different types.

When ordering, specify operating voltage and style of case desired.

This bell is quite generally used with our Autoflags, and thousands of them are in use throughout the world.

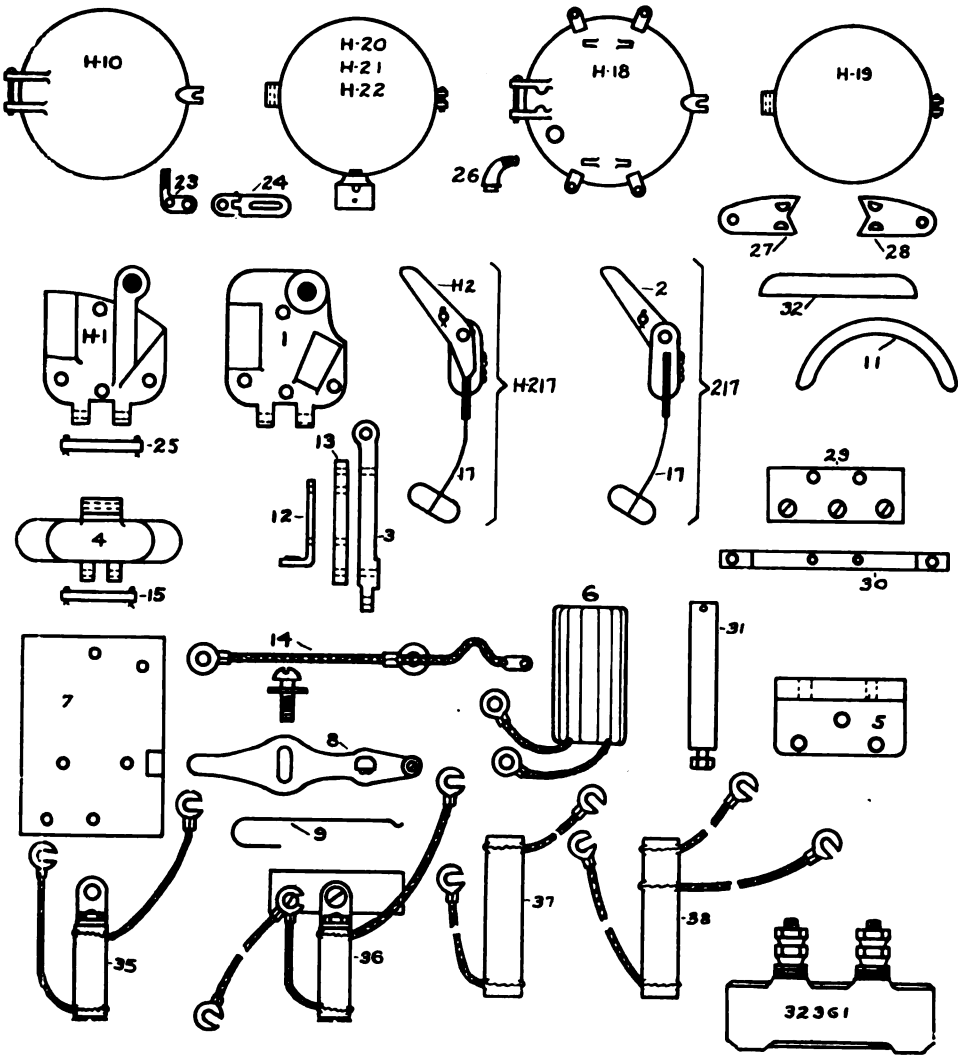
Description

No. 222-A. Bell for mounting on the side of a post or building.
No. 222-B. Bell for mounting on the top of a 3½" inside diameter pipe post.
No. 222-C. Bell for mounting on the top of a 4" inside diameter pipe post.
No. 222-D. Bell for mounting on the top of a 3" inside diameter pipe post.

Digitized by Google

No. 222 Crossing Bell

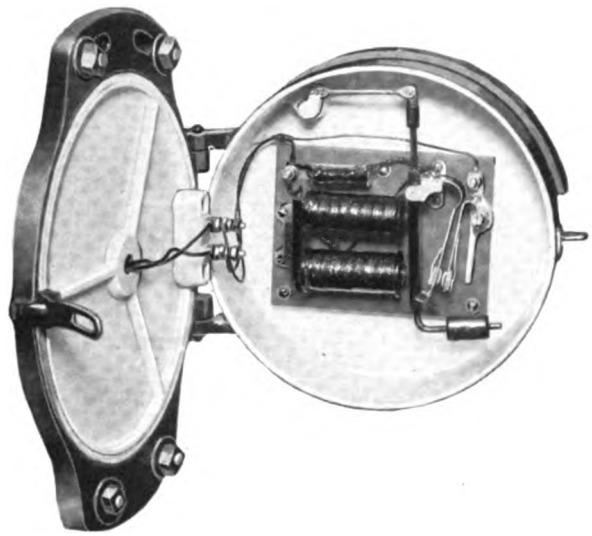
REPAIR PARTS



No.	Description
1.	Old style movement base.
H-1.	Movement base for hinged type bell.
2.	Old style oscillator.
H-2.	Oscillator for hinged type bell.
3.	Operating link.
4.	Armature.
5.	Magnet bracket.
6.	Magnet coil (specify resistance of bell).
7.	Contact block.
8.	Contact finger support.
9.	Contact finger.
10.	Old style case cover and gong support.
H-10.	Hinged type case cover for "B," "C" or "D" bell.
11.	Rain shield.
12.	Moving contact.
13.	Link insulator.
14.	Flexible lead wire.
15.	Operating link pin.
17.	Hammer.
H-18.	Hinged type case cover for "A" bell.
H-19.	Hinged type case for "A" bell.
H-20.	Hinged type case for "B" bell.
H-21.	Hinged type case for "C" bell.
H-22.	Hinged type case for "D" bell.
23.	Locking bolt.
24.	Locking hasp and nut.
25.	Armature shaft.
26.	Wire outlet for "A" bell.
27.	Left hand dust guard.
28.	Right hand dust guard.
29.	Magnet terminal block.
30.	Magnet terminal block support.
31.	Magnet core.
32.	12" steel gong.
35.	Non-arcing resistance for "B," "C" or "D" bell.
36.	Non-arcing resistance for "A" bell.
37.	Shunt resistance for 600 volt bell.
38.	Shunt resistance for 110 volt bell.
217.	Oscillator and hammer assembled for old style bell.
H-217.	Oscillator and hammer assembled for hinged type bell.
32361.	Porcelain terminal block.

Digitized by Google

Style "D" Bell



The Style "D" Highway Crossing Bell was developed to meet the requirements for a gong, proof against weather, bugs and malicious interferences, and at the same time provide a simple, reliable, economical, effective, slow stroke, sonorous and low-priced alarm.

It is not necessary to take the Style "D" Bell apart to inspect it or to guess at the adjustment. The operating mechanism is enclosed in a case provided with a hinged door. Opening the door exposes the entire mechanism for inspection and adjustment with the bell in operation.

There are only two moving parts in the entire mechanism with one set of coils and one set of contact springs. Armature returns to normal position by gravity. Nearly all parts interchangeable with our Style "A" and "AA" Bells. Made for side or top of pole.

A resistance in the circuit absorbs all contact arc, greatly prolongs contact life and prevents interference with radio reception.

In ordering, specify whether for side or top of pole, size of pole and operating voltage.

Standard resistance 10 ohms for operation on 4½ to 8 volts. Higher or lower resistance furnished when specified.

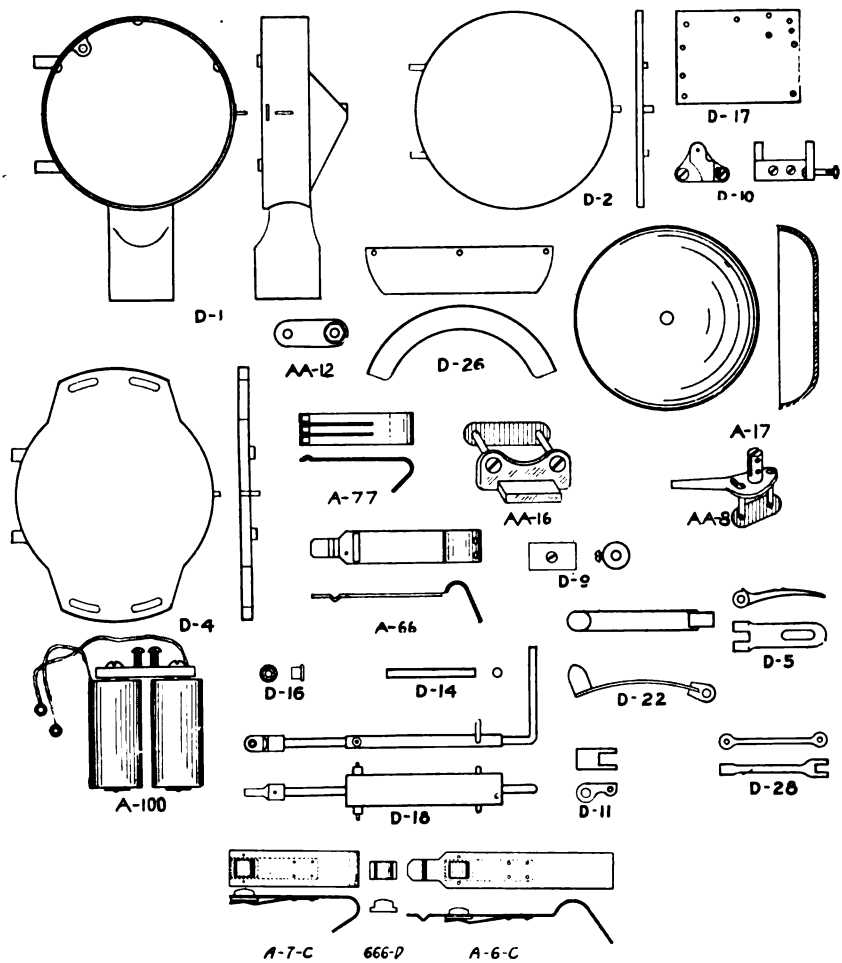
When ordering, specify operating voltage.

	Description
No. D-50.	Style "D" Bell for top of 3" pipe post.
No. D-51.	Style "D" Bell for top of 4" pipe post.
No. D-52.	Style "D" Bell for top of 5" pipe post.
No. D-53.	Style "D" Bell for side of 3" pipe post.
No. D-54.	Style "D" Bell for side of 4" pipe post.
No. D-55.	Style "D" Bell for side of 5" pipe post.

Digitized by Google

Style "D" Bell

REPAIR PARTS



No.	Description
D-1.	Mechanism case — top of pole. (Specify pole diameter.)
D-2.	Door for top of pole mechanism case.
D-3.	Mechanism case—side of pole. (Specify pole diameter.)
D-4.	Door for side of pole mechanism case.
D-5.	Hasp.
D-9.	Counterweight with set screw.
D-10.	Armature hanger with screws.
D-11.	Operating lever.
D-14.	Clapper shaft.
D-16.	Shaft bushing—2 required.
D-17.	Slate base—drilled and enameled.

No.	Description
D-18.	Armature, complete with bearings.
D-22.	Clapper, complete.
D-26.	Weather shield with screws.
D-28.	Connecting rod.
A-6-C.	Contact complete.
A-7-C.	Contact complete.
AA-8.	Adjustment stud with screws.
AA-12.	Binding post and connection.
AA-16.	Magnet support with screws.
A-17.	12" steel gong with cap screw.
A-66.	Coin silver front contact spring.
A-77.	Coin silver back contact spring.
A-100.	Magnet, complete (specify resistance).
666-D.	Contact block only, for A-6-C or A-7-C contact.

Digitized by Google

Highway Crossing Bell No. 1220

GONG TYPE

For Direct Current

The entire actuating mechanism of the No. 1220 Crossing Bell is assembled on one movement base casting and secured in the bell case by means of three machine screws.

The movement is adjustable to regulate the force of the hammer blow on the gong so that any volume of sound desired may be obtained. Regulation for soft tones for residential districts or extremely great sound volume for industrial centers may easily be made.

The circuit breaker arrangement is identical in every detail to that used in our famous No. 222 bell. The vertical link which carries the moving contact is adjustable in length; the spring contact is adjustable for regulation of the contact opening, which should be approximately $\frac{1}{8}$ inch; the throw of the hammer may be regulated by means of the adjusting screws 6 - x - 9 and 6 - x - 10 as shown in the cut on the opposite page. These adjusting screws take up all the shock so that the armature need never become worn as it never strikes the magnet core pole faces. A non-arcing resistance is provided which absolutely absorbs all contact arc, greatly prolongs the contact life and eliminates interference with radio reception.

The bell in general appearance is the same as the No. 222 bell and is furnished for placing on the side of a post or building, or for mounting on the top of a 3, 3½ or 4-inch inside diameter pipe post as specified.

The standard bell, which will be furnished unless otherwise specified, is equipped with 10 ohm coils for operation on 6-8 volts D. C. However, the bell can be furnished for operation on any specified direct current circuit from 2 to 600 volts.

Description

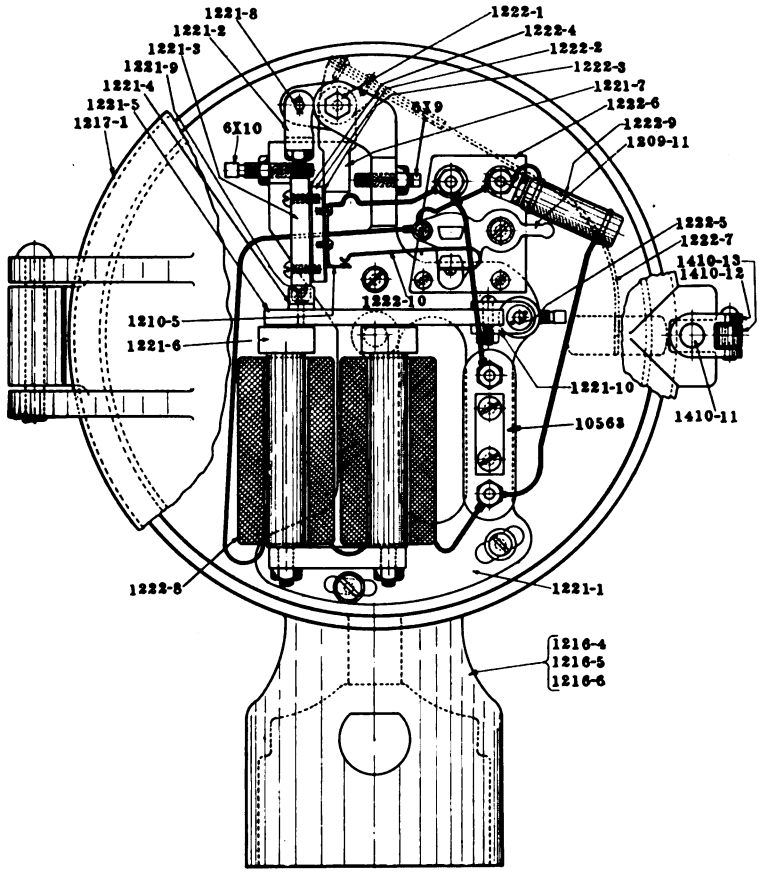
No. 1220-A. Bell for mounting on side of post.
No. 1220-B. Bell for mounting on top of 3½" inside diameter pipe post.
No. 1220-C. Bell for mounting on top of 4" inside diameter pipe post.
No. 1220-D. Bell for mounting on top of 3" inside diameter pipe post.

Specify Operating Voltage

Digitized by Google

No. 1220 Crossing Bell

REPAIR PARTS



No.	Description
6-x- 9.	Stop screw, complete with nut.
6-x-10.	Stop screw, complete with nut.
1209-11.	Contact finger support.
1210- 5.	Moving contact.
1216- 4.	Bell case with socket for 3½" I.D. pipe post.
1216- 5.	Bell case with socket for 4" I.D. pipe post.
1216- 6.	Bell case with socket for 3" I.D. pipe post.
1217- 1.	Bell case cover.
1221- 1.	Mechanism base.
1221- 2.	Screw jaw.
1221- 3.	Vertical link.
1221- 4.	Link bracket.
1221- 5.	Armature.
1221- 6.	Magnet core.
1221- 7.	Oscillator.
1221- 8.	Jaw pin.
1221- 9.	Link bracket pin.
1221-10.	Armature bearing.
1222- 1.	Trunnion screw.
1222- 2.	Insulation block.
1222- 3.	Insulation strip.
1222- 4.	Insulation strip.
1222- 5.	Armature pin.
1222- 6.	Terminal plate.
1222- 7.	Hammer complete with reinforcements.
1222- 8.	Coil (5 ohms resistance for 10 ohm 6-8 volt bell unless otherwise specified).
1222- 9.	Non-arcing resistance.
1222-10.	Contact finger.
1410-11.	Locking eye bolt.
1410-12.	Locking nut.
1410-13.	Locking hasp.
10563.	Porcelain terminal.

See page 57 for additional parts not shown here.

Digitized by Google

Highway Crossing Bell No. 555

GONG TYPE—MOTOR DRIVEN

For 6-600 Volts D. C.—110 or 220 Volts 25 or 60 Cycles

The No. 555 Gong Type Crossing Bell is of the same general appearance as our No. 222 Bell, except that the hinged cover is enlarged to house the motor driven mechanism, which is similar to the mechanism of our No. 444 locomotive bell, consisting of a motor, two gears and a bell hammer. A cam mounted on one of the gear wheels engages and raises a weight to a certain point and then, due to gravity, allows it to drop. The bell hammer is connected to this operating weight by a shaft which causes the hammer to strike the gong a sharp, heavy blow when the weight drops, giving a clear penetrating sound. The hammer blows are so timed that the sound waves of one blow are not broken up by subsequent waves.

This bell can be furnished for use on any specified direct current voltage from 6 to 600; or for use on alternating current commercial lighting circuits of 110 or 220 volts, either 25 or 60 cycle.

When ordering, specify type of case and
If for Direct Current, specify Voltage;
If for Alternating Current, specify Voltage and Frequency.

The bell case is made with three different size mounting sockets.

Description

No. 555-B. Bell for mounting on the top of a 3½" inside diameter pipe post.

No. 555-C. Bell for mounting on the top of a 4" inside diameter pipe post.

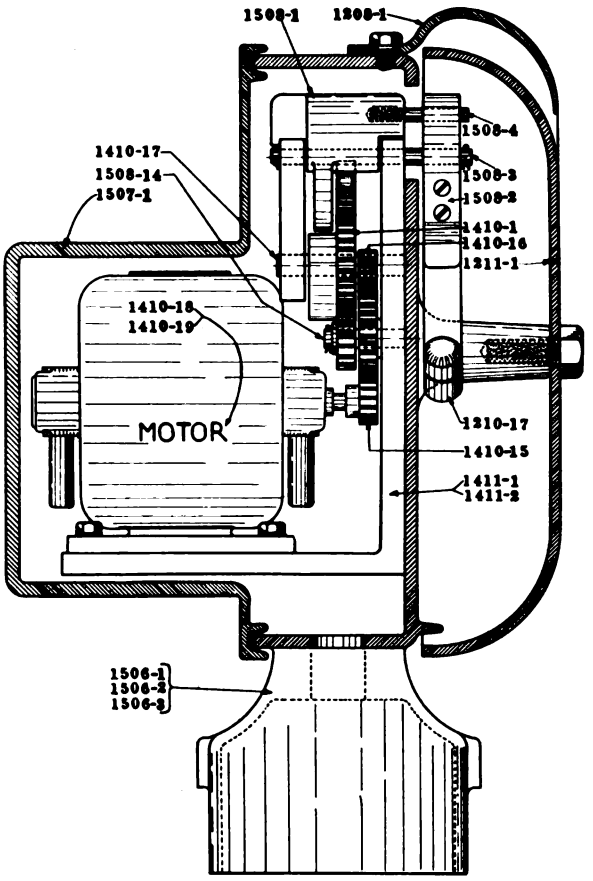
No. 555-D. Bell for mounting on the top of a 3" inside diameter pipe post, or on the side of a post or building (by the use of our No. 161 gooseneck bracket. See page 140.)

Digitized by Google

Highway Crossing Bell No. 555

IMPROVED TYPE

REPAIR PARTS



No.	Description
1208- 1.	Rain shield.
1210-17.	Hammer, complete with reinforcements.
1211- 1.	Steel gong.
1410- 1.	Drive gear.
1410-15.	Motor pinion.
1410-16.	Intermediate gear and pinion.
1410-17.	Drive gear shaft.
1410-18.	A. C. motor (specify voltage and frequency).
1410-19.	D. C. motor (specify voltage).
1411- 1.	Mechanism frame for A. C. bell.
1411- 2.	Mechanism frame for D. C. bell.

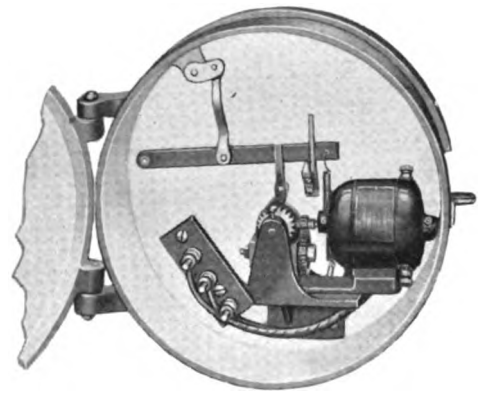
No.	Description
1506- 1.	Mechanism case with socket for 3½" I.D. pipe post.
1506- 2.	Mechanism case with socket for 4" I.D. pipe post.
1506- 3.	Mechanism case with socket for 3" I.D. pipe post.
1507- 1.	Door.
1508- 1.	Operating weight.
1508- 2.	Hammer support.
1508- 3.	Operating weight shaft.
1508- 4.	Operating weight stud.
1508-14.	Intermediate gear stud.

For other parts, see pages 57 and 72.

Digitized by Google

Style "E" Motor Driven Crossing Bell

FOR 110 VOLTS D. C. OR A. C.



In many cases where a 110-volt power or lighting circuit is available it is economical and convenient to use this power for the operation of an alarm bell. The ordinary contact type of bell is not suitable for 110-volt operation, due to excessive arcing at the contacts. The Style "E" Motor Driven Bell is designed for such operation and has the great advantage of being equipped with a universal motor, thus making the same bell applicable to 110-volt D. C. or 110-volt 60 or 25 cycles. The bell is equipped with a terminal block with binding posts for connecting to these various voltages.

The working parts consist of a motor, a worm-driven gear which actuates a cam used to raise a lever to which is attached an adjustable counterweight, and through a link rigidly connected to the bell clapper. The motor, which is manufactured especially for this work, is of the tap-wound type. The selection of this type of motor was made after extended experiments proved that it was the most reliable one for use in securing a more nearly uniform speed and reliable operation.

A terminal block is provided to which the taps for the various voltages are attached. These are plainly stamped so that it is only a matter of attaching incoming wires to their respective terminals.

No contacts are required and all main bearings are provided with special impregnated, oil-less bearings, thus eliminating the necessity of oiling and the likelihood of failures from gummed bearings by the use of improper oil. The motor is connected to the gearing through a flexible connection to prevent any strain on the shaft or gears. For convenience in adjusting the bell a special adjusting screw is provided so that the necessary adjustment of the clapper can be made in the case. With this arrangement it is not necessary to remove the gong for this purpose. The adjustable counterweight provides a means for slight variation in speed of operation and in tone. A buffer spring is provided to govern the speed of the clapper should the voltage impressed across the motor terminals reach a higher value than the rating shown for this motor. Normally, this spring is not in use.

The housing case is the same as has been used with the Type "D" bell and is arranged either for top or side of pole mounting.

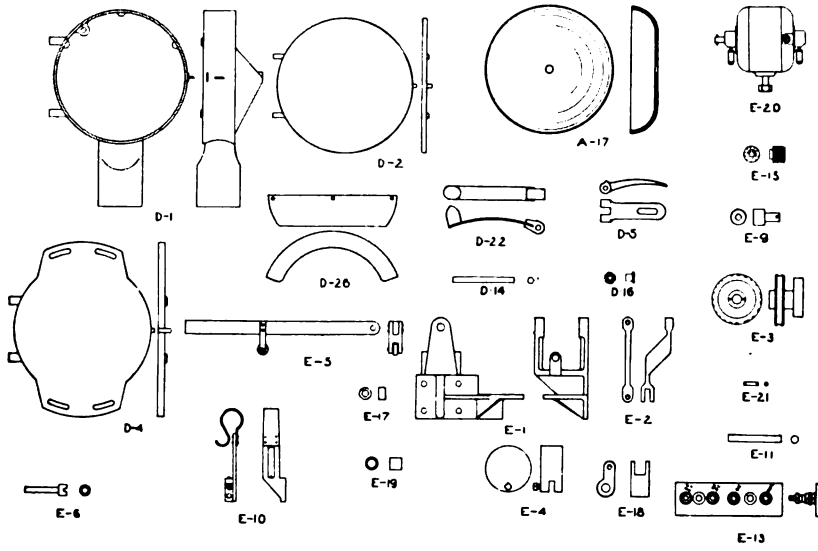
Description

No. E-50. Style "E" Bell for top of 3" pipe post.
No. E-51. Style "E" Bell for top of 4" pipe post.
No. E-52. Style "E" Bell for top of 5" pipe post.
No. E-53. Style "E" Bell for side of 3" pipe post.
No. E-54. Style "E" Bell for side of 4" pipe post.
No. E-55. Style "E" Bell for side of 5" pipe post.

Digitized by Google

Style "E" Bell

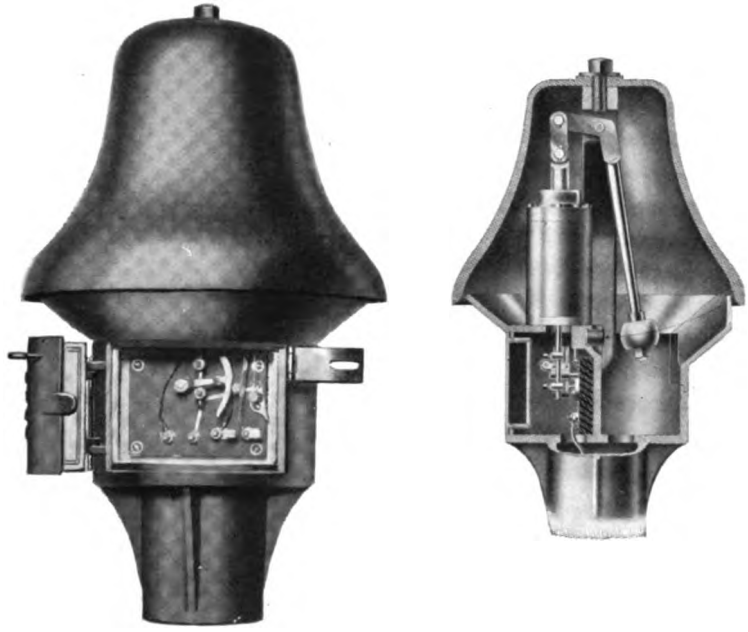
REPAIR PARTS



No.	Description
A-17.	Gong.
D-1.	Mechanism case—top of pole. (Specify pole diameter.)
D-2.	Door for top of pole mechanism case.
D-3.	Mechanism case—side of pole. (Specify pole diameter.)
D4.	Door for side of pole mechanism case.
D-5.	Hasp.
D-14.	Clapper shaft.
D-16.	Shaft bushing, two required.
D-22.	Clapper, complete.
D-26.	Weather shield.
E-1.	Mechanism frame.
E-2.	Connecting rod.
E-3.	Worm gear and cam.
E-4.	Counterweight.
E-5.	Counterweight arm.
E-6.	Motor shaft extension.
E-9.	Pivot post.
E-10.	Guide, complete.
E-11.	Shaft.
E-13.	Terminal block, complete.
E-15.	Worm.
E-17.	Filler block.
E-18.	Operating lever.
E-19.	Bushings, two required.
E-20.	Motor (110 volt Universal).
E-21.	Pivot pin, two required.

Digitized by Google

Style 990 Locomotive Type Bell



The No. 990 Locomotive Type Bell has a gong of the type and size used on locomotives. The mechanism is contained within the gong, as shown in sectional view. The solenoid electro-magnet used delivers powerful strokes upon the inside of the gong at from 40 to 60 blows per minute. The contacts and switch device are mounted on a heavily enameled slate base, contained in a separate and absolutely water-tight compartment, having a large door for easy access and inspection. The armature of the solenoid magnet operates a single-pole snap switch, which makes and breaks the circuit quickly and without loss of power. When the circuit is closed the armature is attracted and the snap switch, actuated by the rocker arm, breaks the circuit just as the heavy hammer strikes a powerful blow upon the inside of the gong. As the circuit is broken the armature and hammer return by gravity to normal position. The highest efficiency with least possible battery consumption is thus attained, current through the bell being actually used only one-half of the time that the bell is in operation. When in operation this bell emits the same loudness and quality of sound, and rings with the same velocity as an ordinary locomotive gong.

Standard resistance 5 ohms for operation on 4½ to 8 volts. Higher or lower resistance furnished when specified.

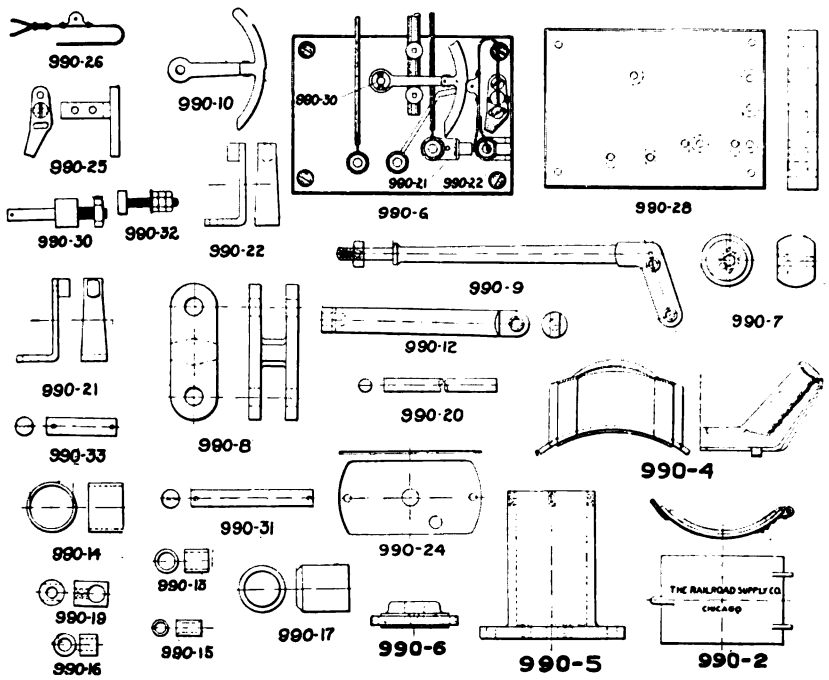
Description

No. 990. Locomotive Type Bell with socket for 4" pipe post.
No. 990-50. Locomotive Type Bell with socket for 3" pipe post.
No. 990-51. Locomotive Type Bell for bolting to top of wood post.
No. 990-52. Locomotive Type Bell with bracket for bolting to face of wood post.
No. 990-53. Locomotive Type Bell with socket for 5" pipe post.

Digitized by Google

Style 990 Locomotive Type Bell

REPAIR PARTS



No.	Description
990-1.	Main casting only.
990-2.	Door, complete with hinge rod.
990-4.	Hand hole cover with bolts.
990-5.	Magnet shell with bolts and screws.
990-6.	Magnet shell cap (without guide).
990-7.	Adjustable bell clapper.
990-8.	Armature connecting link.
990-9.	Steel bell clapper lever, complete with nut.
990-10.	Circuit breaker arm, complete.
990-11.	Steel gong.
990-12.	Brass plated armature.
990-13.	Brass bushings for clapper lever (3 required).
990-14.	Armature guide bushing.
990-15.	Hard rubber magnet bushing (2 required).
990-16.	Hard rubber magnet shell bushing (2 required).
990-17.	Soft rubber bumper.
990-19.	Switch operating studs (2 required).
990-20.	Switch operating rod.
990-21.	Magnet contact post, complete.
990-22.	Flasher contact post, complete.
990-24.	Armature striker plate.
990-25.	Adjustment stud.
990-26.	Contact spring, complete.
990-28.	Slate base, drilled and enameled.
990-29.	Magnet spool.
990-30.	Circuit breaker pivot.
990-31.	Clapper pivot pin.
990-32.	Binding post, complete.
990-33.	Connecting link pivot (2 required).
990-G.	Slate base mechanism, complete.

Digitized by Google

No. AL-50 Motor Driven Locomotive Type Bell

The Motor Driven Locomotive Type Bell is particularly adapted for use where a Locomotive Type Bell is required to operate on alternating current.

The tone of this bell is pleasing, yet the sound is penetrating, carries well and can be heard above the noise of highway traffic and industrial activities.

The mechanism is extremely simple, consisting of a motor and a train of gears which drive a cam used to raise and drop a weight which is so attached to the clapper as to cause it to deliver heavy, evenly-timed blows on the inside of a 16-inch heavy steel gong. The motor and gears are mounted on a removable base which is placed in a weatherproof compartment.

The Bell may be equipped to operate on 10, 110 or 220 volts D. C. or 110 volts 25 or 60 cycles A. C. Specify operating voltage required.

Description

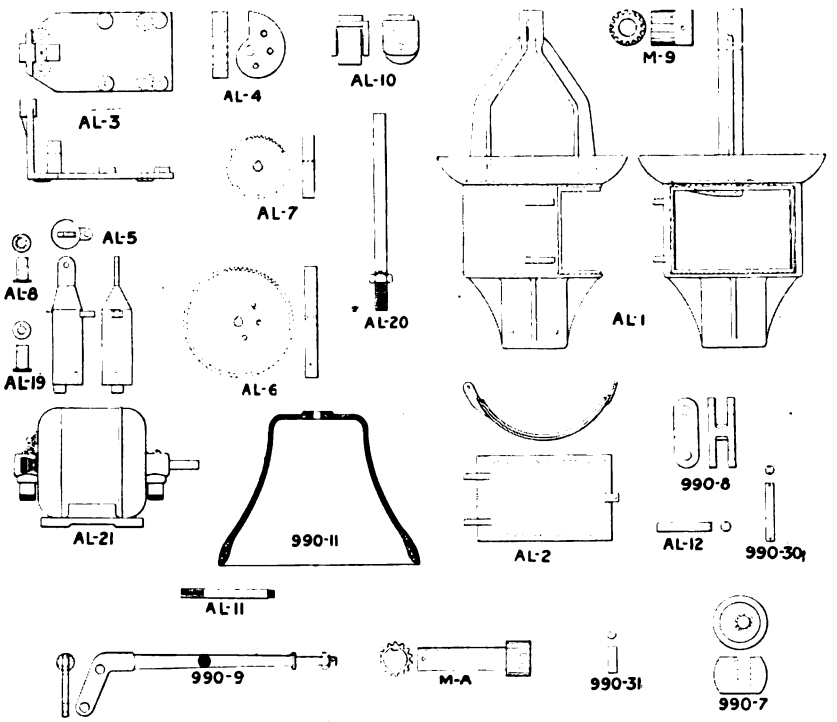
No. AL-50. Motor Driven Locomotive Type Bell for top of 4″ pole. (Specify voltage and whether A. C. or D. C.)

No. AL-51. Motor Driven Locomotive Type Bell for top of 5″ pole. (Specify voltage and whether A. C. or D. C.)

Digitized by Google

No. AL-50 Motor Driven Locomotive Type Bell

REPAIR PARTS



No.	Description
AL-1.	Mechanism case.
AL-2.	Mechanism case door.
AL-3.	Mechanism frame.
AL-4.	Cam with screws.
AL-5.	Operating weight, complete with bumper.
AL-6.	Spur gear.
AL-7.	Spur gear.
AL-8.	Bronze bushing for M-8.
AL-10.	Roller and bracket, complete as shown.
AL-11.	Up and down rod.
AL-12.	Gear shaft.

No.	Description
AL-19.	Bronze bushing for AL-12.
AL-20.	Guide stud.
AL-21.	Motor. (Specify voltage or voltage and frequency.)
M-8.	Pinion and shaft.
M-9.	Motor pinion.
990-7.	Clapper.
990-8.	Connecting link.
990-9.	Clapper rod.
990-11.	Steel gong.
990-30.	Clapper pivot pin.
990-31.	Connecting rod pivot pin.
1251-1.	Terminal block with screws.

Digitized by Google

No. 444

No. 444-R

Highway Crossing Bell No. 444

IMPROVED TYPE

LOCOMOTIVE TYPE—MOTOR DRIVEN

For 6-600 Volts D. C., 110 or 220 Volts 25 or 60 Cycles

Though not harsh, the sound of this bell is clear and penetrating and can be heard at a distance and above the noise of approaching vehicles or automobiles and is the same as that of a locomotive, in fact, it is an engine bell.

The mechanism of this bell is very simple, consisting of a motor, two gears and a bell hammer. A cam mounted on one of the gear wheels engages and raises a weight to a certain point and, due to gravity, allows it to drop. The bell hammer is connected to this weight through an up-and-down rod which causes the hammer to deliver a sharp, heavy blow to the bell when the weight drops. The blows are so timed that the sound waves of one blow are not broken up by subsequent waves.

The mechanism, including the motor, is mounted on a cast base which is fastened in the case by means of four machine screws. To remove the mechanism it is only necessary to take out these screws and disconnect the up-and-down rod. The case is provided with front and rear doors which allow access to all parts for inspection and adjustment or oiling while the bell is in operation.

This bell can be mounted on the top of a 4" inside diameter pipe post, or used in connection with our Autoflags and Crossing Signals.

Contacts may be provided if desired which can be used to flash a red lamp, as shown in the lower illustration, or an illuminated sign.

This bell can be furnished for use on any specified Direct Current voltage from 6 to 600 or for use on Alternating Current commercial lighting circuits of 110 or 220 volts, 25 or 60 cycles.

When ordering, specify: Voltage, if for Direct Current; Voltage and Frequency, if for Alternating Current.

Description

No. 444. Locomotive type crossing bell.

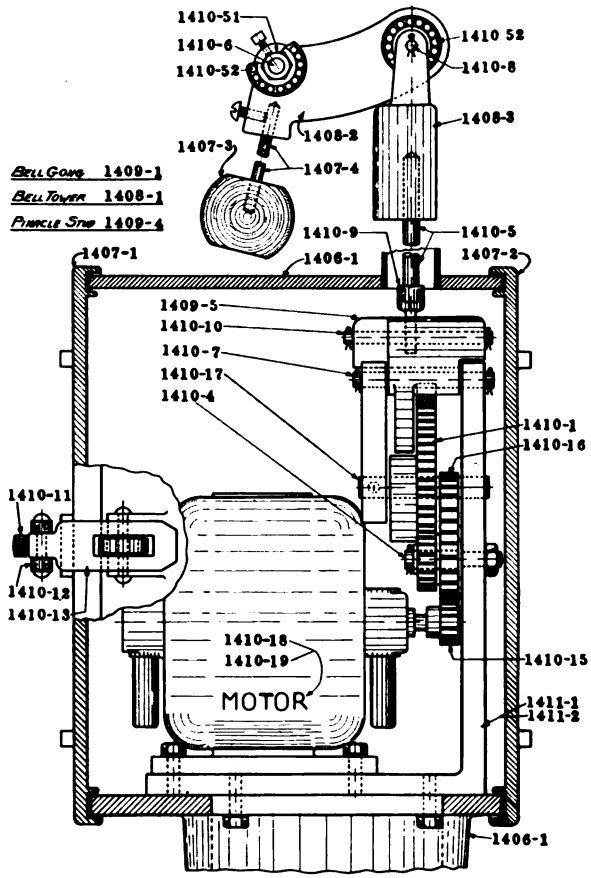
No. 444-R. Locomotive type crossing bell, with flashing red lamp.

Digitized by Google

Locomotive Crossing Bell No. 444

IMPROVED TYPE

REPAIR PARTS



No.	Description
1406- 1.	Bell case.
1407- 1.	Front door.
1407- 2.	Back door, complete with hook.
1407- 3.	Hammer ball.
1407- 4.	Hammer rod.
1408- 1.	Bell tower.
1408- 2.	Hammer crank.
1408- 3.	Counterweighted jaw.
1409- 1.	Bell gong.
1409- 4.	Pinnacle stud.
1409- 5.	Operating weight.
1410- 1.	Drive gear.
1410- 4.	Intermediate gear stud and nut.
1410- 5.	Up-and-down rod.
1410- 6.	Hammer crank shaft.
1410- 7.	Operating weight shaft.
1410- 8.	Counterweighted jaw pin.
1410- 9.	Up-and-down rod lug.
1410-10.	Shaft for up-and-down rod lug.
1410-11.	Locking eye bolt.
1410-12.	Locking nut.
1410-13.	Locking hasp.
1410-15.	Motor pinion.
1410-16.	Intermediate gear and pinion.
1410-17.	Drive gear shaft.
1410-18.	A. C. motor (specify voltage and frequency).
1410-19.	D. C. motor (specify voltage).
1410-51.	Thin hexagon nuts.
1410-52.	Ball-bearing complete.
1411- 1.	Mechanism frame for A. C. bell.
1411- 2.	Mechanism frame for D. C. bell.

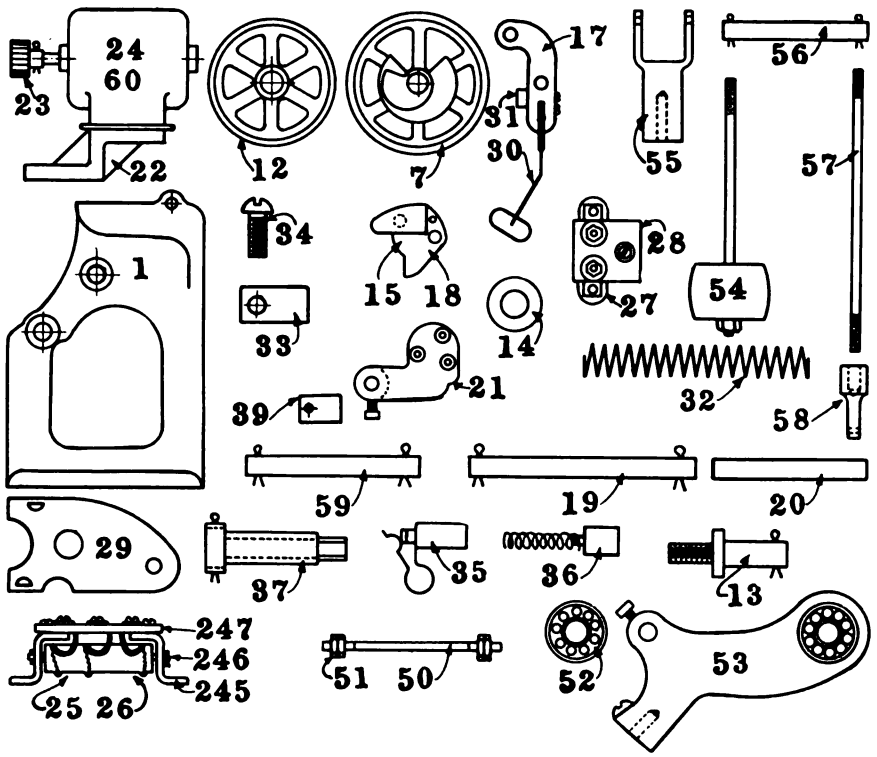
For other parts, see page 72.

Digitized by Google

Highway Crossing Bell Nos. 444 and 555

OLD TYPES WITH SMALL MOTOR

REPAIR PARTS



Parts Common to both No. 444 and No. 555 Bells

No.	Description
1.	Movement frame.
7.	Drive gear and cam complete.
12.	Intermediate gear and pinion.
13.	Stud for intermediate gear.
14.	Washer for intermediate gear.
15.	Operating weight for No. 444 bell.
18.	Operating weight for No. 555 bell.
19.	Shaft for operating weight.
20.	Drive gear shaft.
21.	Drive gear shaft support.
22.	Motor bracket.
23.	Motor pinion.
24.	110 volt A. C. motor (specify frequency).
25.	Right hand voltage control resistance.
26.	Left hand speed control resistance.
27.	Porcelain terminal.
28.	Fibre terminal plate.
35.	Brush connection clip for A. C. motor.
36.	Motor brush and tension spring.
37.	Brush holder sleeve.
39.	Brush tension plug for D. C. motor.
60.	6-8 volt D. C. motor.
245.	Resistance unit support.
246.	Resistance unit support shaft.
247.	Resistance unit terminal plate.

Parts for No. 444 Bell Only

50.	Hammer crank shaft.
51.	Hexagon nut for hammer crank shaft.
52.	Ball bearing for hammer crank shaft.
53.	Hammer crank with ball bearing.
54.	Hammer, complete as shown.
55.	Counter weight jaw.
56.	Shaft for counter weight jaw.
57.	Up-and-down rod.
58.	Up-and-down rod lug.
59.	Shaft for up-and-down rod lug.

Parts for No. 555 Bell Only

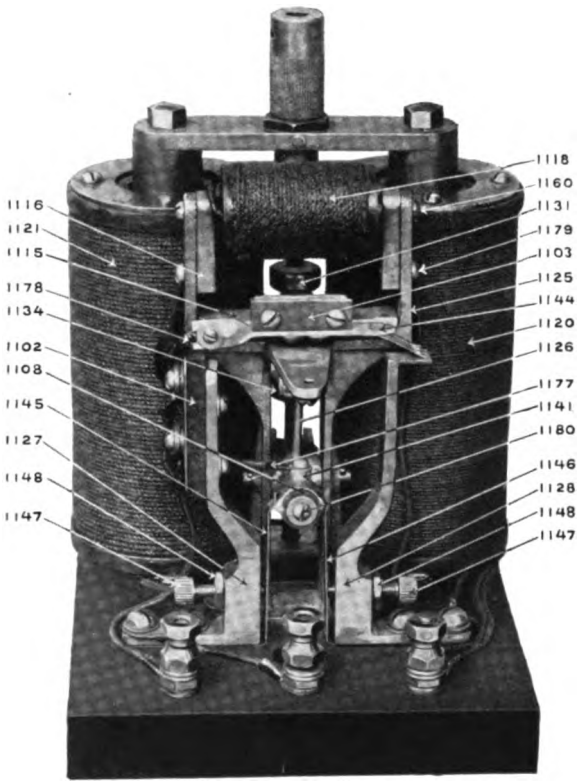
17.	Hammer support.
29.	Dust shield.
30.	Hammer and reinforcements only.
31.	Spring plug (hammer end).
32.	Spring.
33.	Spring rocker plug.
34.	Supporting screw for rocker plug.

Digitized by Google

Locomotive Crossing Bell No. 333

REPAIR PARTS

(Manufacture Discontinued)

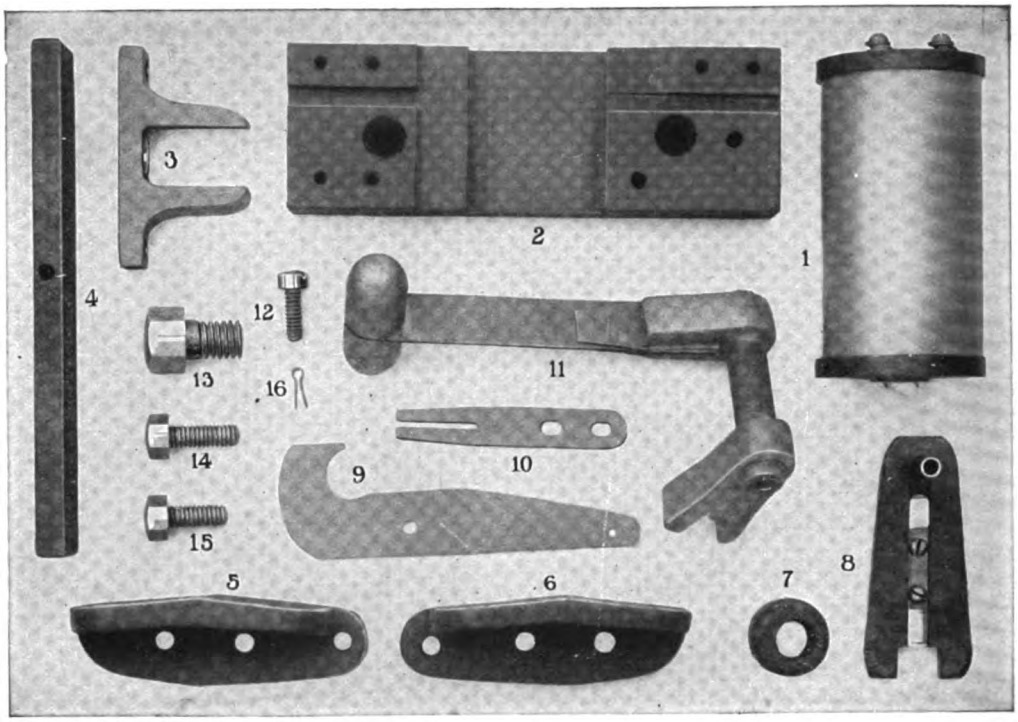


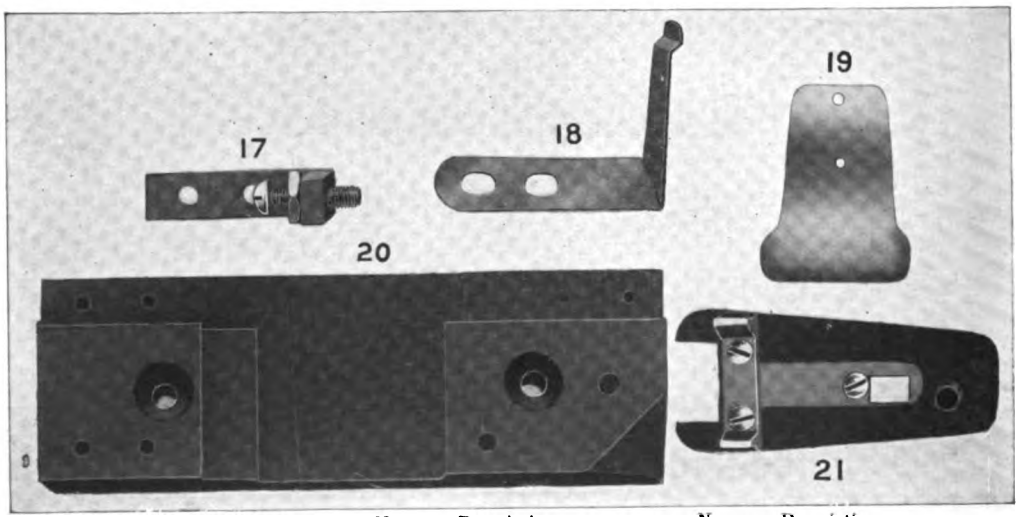
No.	Description
1004.	Hammer.
1010.	Ball bearing for hammer shaft.
1012.	Hammer jaw with pin for connecting hammer to up-and-down rod.
1014.	Up-and-down rod.
1102.	Insulating strip for contact post.
1103.	Insulating block for gravity contact.
1108.	Insulating bushing for oscillator.
1115.	Armature for gravity circuit closer.
1116.	Pole piece for gravity closer.
1118.	Coil complete for gravity circuit closer.
1120.	Right hand operating coil.
1121.	Left hand operating coil.
1125.	Circuit breaker frame.
1126.	Oscillator.
1127.	Contact post—left hand.
1128.	Contact post—right hand.

No.	Description
1131.	Collar for operating circuit breakers.
1134.	Regulator roller and spring complete.
1141.	Oscillator contact.
1144.	Contact finger for gravity circuit closer.
1145.	Light contact finger.
1146.	Operating contact finger.
1147.	Adjusting screw.
1148.	Lock nut.
1152.	Ball bearings for bell hammer (set of 2).
1160.	Screw holding gravity coil.
1177.	Flexible lead wire for oscillator.
1178.	Flexible lead wire for gravity contact.
1179.	Lining screw for pole piece No. 1116.
1180.	Contact retaining screw.

Digitized by Google

No. 666 Crossing Bell Repair Parts





No.	Description
1.	Magnet.
2.	Contact block.
3.	Armature stop.
4.	Armature.
5.	Right hand bracket.
6.	Left hand bracket.
7.	Fibre bushing.
8.	Old style swing bar.

No.	Description
9.	Dust guard.
10.	Contact spring.
11.	Oscillator complete.
12.	Fillister head screw.
13.	Cap screw, ½x3¼ inch.
14.	Cap screw, ⅜x⅞ inch.
15.	Cap screw, ⅜x¾ inch.

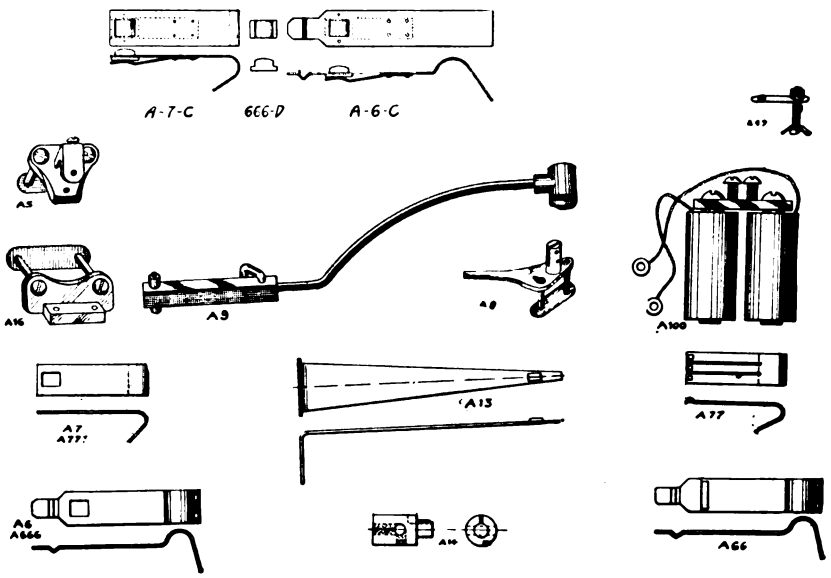
No.	Description
16.	⅛x½ inch cotter pin.
17.	Contact finger stop.
18.	Contact finger.
19.	Regulator spring.
20.	New style contact block.
21.	New style swing bar, complete with flexible connection.

Digitized by Google

Style "A" and Style "AA" Bell

(Manufacture Discontinued)

REPAIR PARTS



When ordering, specify whether for Style "A" or Style "AA" Bell.

DESCRIPTION

No. A-5.	Armature Hanger with screws.
No. A-6.	Carbon Front Contact Spring.
No. A-66.	Coin Silver Front Contact Spring.
No. A-666.	Silver-Carbon Front Contact Spring.
No. A-6-C.	Contact complete.
No. A-7-C.	Contact complete.
No. A-666-D.	Contact Block only for A-6-C and A-7-C contact.
No. A-7.	Carbon Back Contact Spring.
No. A-77.	Coin Silver Back Contact Spring.
No. A-777.	Silver-Carbon Back Contact Spring.
No. A-8.	Adjustment Stud with insulations and screws.
No. A-9.	Armature and Bell Clapper, complete with bearing.
No. A-12.	Binding Post, complete.
No. A-13.	Tell-Tale Contact Spring, complete.
No. A-14.	Tell-Tale Contact Post, complete.
No. A-16.	Magnet Support, with screws.
No. A-100.	Magnet complete (specify resistance).

Digitized by Google

No. 151020

Type "HCS" Vibrating Bell

N. E. C. STANDARD

For Low Voltage Direct Current

This bell is of the finest construction throughout, is very neat in appearance, and is exceedingly efficient and reliable. It is of the iron box type, dust-proof, equipped with triple silver contacts and enamel wire wound magnets. Electrical mechanism insulated from the frame with approved insulating material.

May be mounted on wood mat or arranged for surface or concealed conduit work. Surface and flush type boxes are drilled top and bottom for ½" conduit unless otherwise specified.

Standard finish—Case, black enamel baked on; gong, dull black.

Description

No. 151020A. 3" pressed steel gong, 40 ohms.
No. 151020B. 4" pressed steel gong, 40 ohms.
No. 151020C. 6" pressed steel gong, 40 ohms.
No. 151020D. 8" pressed steel gong, 30 ohms.
No. 151020E. 10" pressed steel gong, 30 ohms.

Description

No. 151020N. 1⅜" cast bell metal sleigh gong, 40 ohms.
No. 151020PA. 2½" cast bell metal cow gong, 40 ohms.
No. 151020PB. 4" cast bell metal cow gong, 40 ohms.
No. 151020PC. 6" cast bell metal cow gong, 30 ohms.

Type "HC" Single Stroke Bells

FOR OPERATION ON DIRECT CURRENT ONLY

This type of bell has been designed for use with signaling systems requiring a plain and distinctive code signal and operating from direct current light and power circuits. The case is made of cast iron and contains the operating magnets, armature, and terminal connections.

No. 151120

The signal given is similar to that obtained by the use of electro-mechanical bells. In construction, however, this type of bell differs materially from the electro-mechanical, as it contains no gears or clockwork and therefore needs no winding. It has no electric contacts or springs of any kind.

These bells are furnished with outlet boxes, which are included in the price of the bells.

Standard finish for bell case is black enamel, and for the gong, dull black.

Description

No. 151120A. Single Stroke Bell, 6" pressed steel gong, 4 ohms.
No. 151120B. Single Stroke Bell, 8" pressed steel gong, 4 ohms.
No. 151120C. Single Stroke Bell, 10" pressed steel gong, 4 ohms.
No. 151120D. Single Stroke Bell, 12" pressed steel gong, 4 ohms.

A maximum of 14 bells in series can be used on a 115-volt direct-current circuit. A lesser number of bells requires the insertion of a compensating resistance. Each bell when used on battery circuits requires for its operation 8 volts.

Specify whether outlet box for surface or concealed conduit is required. Standard outlet boxes are tapped top and bottom for ¾" conduit.

Digitized by Google

Type HCAD Bell

N. E. C. STANDARD

For Alternating Current

No. 151017

This is an entirely new bell operated on an entirely new principle. The hammer rod vibrates independent of the frequency of the current. There is a very slight interval of time between each stroke. Thus the gong is struck a succession of quick, powerful blows, which brings out the full resonance of the gong. A clearer, louder, richer tone is therefore obtained.

It may be used on alternating current from 10 to 110 volts—from the lighting circuit or a transformer.

The coil is wound on a laminated core, which is absolutely necessary for efficient operation on alternating current. The hammer rod is under the gong, which is struck from the inside; this, besides protecting the hammer rod from injury, adds to the pleasing appearance of the bell.

Adjustment can be made with the fingers, and, when set, is automatically locked in any position. The frame and cover are heavy castings; the gong is of hot-pressed steel, which, under actual tests, has proven more resonant and sound-giving than any other type of gong. The frame is finished in dull black enamel and the gong is also finished dull black.

Description

No. 151017. "AD" Bells with pressed steel gongs for operation on 12 volts, 60 cycles. Furnished with 6", 8", 10" or 12" gongs as specified.

No. 151017F. "AD" Bells with pressed steel gongs for operation on 12 volts, 25 cycles. Furnished with 6", 8", 10" or 12" gongs as specified.

No. 151017H. "AD" Bells with pressed steel gongs for operation on 110 volts, 60 cycles. Furnished with 6", 8", 10" or 12" gongs as specified.

No. 151017L. "AD" Bells with pressed steel gongs for operation on 110 volts, 25 cycles. Furnished with 6", 8", 10" or 12" gongs as specified.

Watertight Push Buttons

LOW VOLTAGE

No. 151070

Designed for use in exposed places and are absolutely impervious to water. Contact springs are heavy German silver, thoroughly insulated. Will carry 2 amperes up to 30 volts.

Case is of cast composition and made in two types. In the standard type, No. 151070, the wires enter from the back through separate holes. No. 151075 has a boss extending from the back tapped for ½" conduit.

Standard finish—black oxidized.

Description

No. 151070. Surface type, 2¼" diameter at base.

No. 151075. Concealed conduit type, 2¼" diameter at base.

Luminous Push Button

No. 151082

This luminous push button is made up like the standard midget push button with the exception that a radioactive compound is painted on the plunger, which is covered with a glass cap. This construction makes the push button illuminative in a darkened room, or in a dimly lighted place.

Description

No. 151082. Luminous push button.

Digitized by Google

No. 17 Economy Skeleton Bell

No. 17. Economy Bell

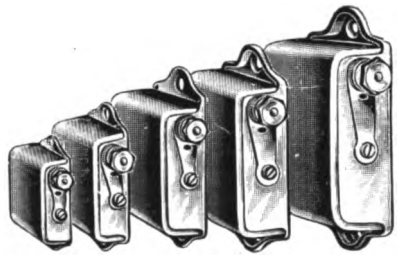
The Economy Skeleton Bell is furnished with a resistance of 3 ohms, unless otherwise specified. Special resistances from 1 to 1500 ohms furnished if required.

A fully insulated, loud ringing bell for ordinary purposes. The outstanding feature of the bell is the intensified stroke of the armature and the high efficiency obtained by the contact construction and method of opening the circuit.

Furnished with 3, 4, 5, 6, 8, 10 or 12″ gong, as specified.

Lungen Bells and Buzzers

3 OHMS RESISTANCE



Size 0 1 2 3 4

Contacts of Lungen Bells and Buzzers are adjustable. Nickel plated brass cover and cast base fit tightly and are bug and dust proof. Springs are highest grade phosphor bronze and contacts hard drawn silver. Bells are made in two styles. No. 13 is furnished with 1, 1¼, 2½, 3 and 4″ gongs. No. 14 is furnished with gongs 5, 6, 8, 10 and 12″ in diameter. Buzzers are furnished in the sizes shown.

Iron Box Bells and Buzzers

Fahnestock Clips are used to facilitate connections to this bell. Hammer rod, ball and armature are all one piece. The hammer ball is under the gong to prevent disarrangement.

The armature is pivoted at the **nearest possible point** to the cover where there is practically no side motion; the hole therefore is only slightly larger than the rod itself and the bell is practically weather, bug and dust proof.

Class "C" Bell (2 Ohms)	Size
No. 700	2½″
No. 722	3″
No. 724	4″
No. 725 Buzzer	

Class "A" Bell (5 Ohms)	Size
No. 700	2½″
No. 702	3″
No. 704	4″
No. 705 Buzzer	

Class "B" Bell (2 Ohms)	Size
No. 710	2½″
No. 712	3″
No. 714	4″
No. 715 Buzzer	

Bells of special resistance furnished if required.

Digitized by Google

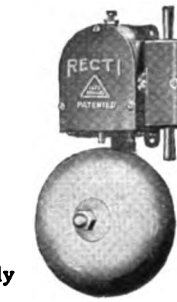
"Recti" Weatherproof Bells

4 TO 220 VOLTS DIRECT CURRENT
110 OR 220 VOLTS ALTERNATING CURRENT

No. 100

No. 219. Underdome Type

Recti Buzzer No. 220
For Direct Current Only



No. 1001
Conduit Type

The Recti bell is absolutely dependable and may be relied upon to give satisfactory service under extreme conditions of heavy duty and weather exposure. In design the movement is what is known as the straight line or plunger type. The mechanism is liberally proportioned and so secured that adjustment and positive operation is always assured.

Magnets are scientifically proportioned for efficiency and current economy and are impregnated with an insulating, moisture repelling compound.

Adjustment can easily be made, without removing cover, by means of heavy screw and locknut at end of case.

Nos. 100 and 100 A. C. specially adapted for fire alarms, factories, signal systems, mine or marine use. Mechanism entirely insulated from case. External binding posts provided for connections.

Nos. 1001 and 1001 A. C. conduit type. A detachable conduit fitting enclosing binding posts is secured to case. Bells may be attached at any time by machine screws furnished. Pipe plug furnished with each bell so one opening may be closed when bell is used on end of line. Drilled for ½" conduit, or ¾" if spcified.

Approved by the National Board of Fire Underwriters.

No. 220 Buzzer for D. C. only. No. 220A same movement as 3" bell. Resistance 2 ohms for 4 volts D. C. No. 220B same movement as 5" bell. Resistance 4 ohms for 6 volts D. C.

No. 100. RECTI BELL FOR BATTERY

Diam. of Gong	No. of Dry Cells	Amps. per Bell	Ohms Resistance
3	3	.35	2
4	3	.35	2
5	4	.30	4
6	4	.30	4
8	4	.30	4
10	6	.20	6
12	6	.20	6
14	8	.12	10
16	8	.12	10
18	8	.12	10

No. 1001. RECTI BELL FOR BATTERY

Diam. of Gong	No. of Dry Cells	Amps. per Bell	Ohms Resistance
4	3	.35	2
5	4	.30	4
6	4	.30	4
8	4	.30	4
10	6	.20	6
12	6	.20	6

BUZZER

No. 220-A	3	.35	2
No. 220-B	4	.30	4

110 volt D. C. Bells have a resistance of 500 ohms and the 220 volt D. C. Bells are of 2,000 ohms resistance.

Bells are furnished for 110 volts or 220 volts 40 to 60 cycles with 4, 5, 6, 8, 10 or 12-inch gongs.

No. 219 Underdome type is same as No. 100, except gong is mounted over the case and hammer strikes inside.

Digitized by Google

No. 510 Transformer Bells

Standard Winding, 6 to 24 Volts A. C., 60 Cycles
Can be furnished to operate at 25 to 40 Cycles

No. 510

No. 510. Buzzer

No. 510. Conduit Type

APPROVED BY THE NATIONAL BOARD OF FIRE UNDERWRITERS

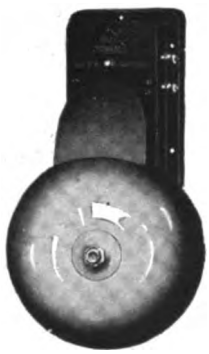
For years it was considered impossible to obtain satisfactory results from large bells on low voltage Alternating Current. This was due to heavy moving parts and general characteristics of design. The Edwards Transformer Bell has been made to overcome all these difficulties. It embodies among other special features the vibrating reed principle, and response to period frequency is obtained with the greatest current economy. The result is a powerful blow and maximum sound.

The bells can be furnished with 3, 4, 5, 6, 8, 10 or 12 inch gongs as specified. The buzzer is furnished in one size only.

Either weatherproof or non-weatherproof cases can be furnished with or without the conduit attachment as conditions may require.

Electro Mechanical Bells

FOR 4 TO 110 VOLTS D. C.—OPEN OR CLOSED CIRCUIT
FOR 110 VOLTS A. C.—OPEN CIRCUIT ONLY



No. 133

Resistance—5 to 20 ohms, as specified.

No. 133. Non-conduit.

No. 1331. Surface conduit.

No. 1330. Concealed conduit.

No. 1330 and 1331 furnished for ½" conduit (¾" if specified).

Operated by a strong spring mechanism which is released by an exceptionally small flow of current. Mechanism is entirely insulated from the case. Binding posts are on the side of the case where they are most accessible.

No. 1331

Furnished in the following types:

Type S. Single stroke. Open or closed circuit on Direct Current. Open circuit only on A. C.

Type A. Constant ringing as long as circuit is closed.

Type B. Constant ringing as long as circuit is open.

Type C. Constant ringing when circuit is closed, even though it be opened again.

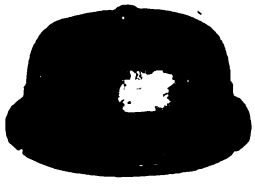
Type D. Constant ringing when circuit is open, even though it be closed again.

Furnished with 6, 8, 10, 12, 14 or 18 inch gongs as specified.

Digitized by Google

No. 156 Monitor Bell

3 Ohms—Diameter 3 Inches



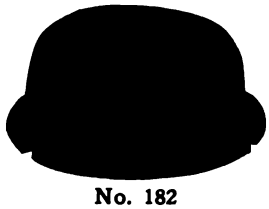
No. 156

This bell is entirely self-contained. The hammer and rod act in a straight line, striking the inside of the gong. There are therefore no breaks in the symmetry of the case or gong. This makes a very attractive looking bell in addition to being weather, bug and dust proof. Springs are the best possible grade phosphor bronze. Contacts are pure, hard drawn silver. Finish—black base, nickel gong.

No. 156. Diameter, 3 inches. Resistance, 3 ohms.
Special resistances from 1 to 200 ohms can be furnished.

No. 182 Car Buzzer

3 Ohms—Diameter 3 inches



No. 182

A distinct departure from the usual form of buzzer. Instead of depending on the vibrations of an armature for sound a complete bell mechanism is used, the hammer rod striking the inside of the protecting case. It produces a character of sound distinctly audible above all usual car noises. Mounted on a gasket it is safe from unauthorized adjustment and is waterproof. Finish—Black enamel.

No. 182. Diameter, 3 inches. Resistance, 3 ohms.
Special resistances from 1 to 200 ohms can be furnished.

No. 222-E Heavy Duty Buzzer

6 and 110 Volts D. C.

No. 222-E

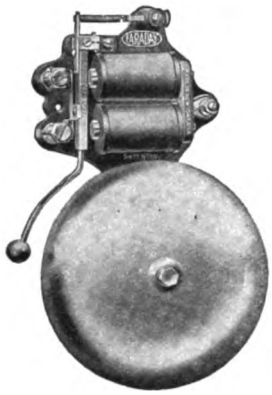
A grade of buzzer far above the average both in appearance and design. Constructed on the vibrating reed principle to meet the demand for a heavy duty, adjustable D. C. buzzer. Carbon contacts are used which will outwear any metal, are easily renewable and cannot oxidize, stick or corrode. Finish—Black enamel.

No. 222-E. 3 inches square for 6 volts D. C.
No. 222-F. 3 inches square for 110 volts D. C.
Special resistances from 1 to 1500 ohms can be furnished.

Digitized by Google

Model "O" Skeleton Bell

FOR BATTERY CIRCUITS



Model "O"

Have high power pivoted armatures giving twice the volume of sound that ordinary construction affords. Mechanism fully insulated. Adjustable locking side contacts and cylindrical trunion bearings. Breakage of tension spring does not disable bell. Wound to any special resistance, but furnished as shown below unless otherwise ordered:

Size Gong, Inches	Resistance, Ohms	Size Gong, Inches	Resistance, Ohms
2½	3	8	5
3	3	10	5
4	3	12	5
5	4	14	5
6	4	16	8
		18	8

The Model "Z" is a lower priced skeleton bell similar to the Model "O," but furnished in same resistances and in all sizes shown for Model "O" up to and including 12 inch gongs.

Admittedly not as desirable for important signal work.

Eclipse PR Bells and Buzzers

FOR BATTERY CIRCUITS OR 6 VOLTS A. C. BELL RINGING TRANSFORMERS

Standard resistance 2 ohms. Non-adjustable side contacts. Finish, black with nickel gong and binding posts. Gong, 2½ inches in diameter.

No. 200. Eclipse Buzzer—resistance, 2 ohms.
No. 201. Eclipse Bell—resistance, 2 ohms.

PR "XXX" Bells and Buzzers

Similar in every way to the Eclipse type, except they have adjustable double-lock side contacts. Resistance, 2 ohms.

No. 210. PR. "XXX" Buzzer.
No. 211. PR. "XXX" Bell—2½" gong.
No. 212. PR. "XXX" Bell—3" gong.
No. 213. PR. "XXX" Bell—4" gong.

PR "Marlo" Bells and Buzzers

Have pivoted armatures, double-lock adjustable side contacts, back-tension adjustments and full insulated mechanisms.

Both inside and outside binding posts are provided. For battery circuits or 6 volts A. C. from Bell Ringing Transformers. Standard resistance, 3½ ohms. Special resistances up to 200 ohms furnished to specification.

No. 0220. PR. "Marlo" Buzzer.
No. 0221. PR. "Marlo" Bell—2½" gong.
No. 0222. PR. "Marlo" Bell—3" gong.
No. 0223. PR. "Marlo" Bell—4" gong.

NOTE—Cow or sleigh gongs can be furnished.

If several bells are to be operated from transformer, specify "Marlo" Transformer Bell and give frequency.

Digitized by Google

PR. Giant Cast-Iron-Clad Bells

PLUNGER TYPE—N. E. C. STANDARD

For Battery or D. C. Commercial Circuits

Model "XA"

Cast iron housing with rubber gasketed cover. Drilled for ½ inch conduit. When used with conduit, bells are weatherproof. Furnished for D. C. operation on any specified D. C. voltage from 10 volts to 30 volts and 110 or 220 volt D. C. commercial circuits, as specified.

No. XA-6. D. C. Plunger Type Bell— 6″ gong.
No. XA-8. D. C. Plunger Type Bell— 8″ gong.
No. XA-10. D. C. Plunger Type Bell—10″ gong.
No. XA-12. D. C. Plunger Type Bell—12″ gong.

For Transformer and A. C. Light or Power Circuits

Same as Type XA, except specially constructed for operation on 12 to 18 volts, 50-60 cycles; 110 or 220 volts, 60 cycle commercial circuits, as specified.

No. XTA-6. A. C. Plunger Type Bell— 6″ gong.
No. XTA-8. A. C. Plunger Type Bell— 8″ gong.
No. XTA-10. A. C. Plunger Type Bell—10″ gong.

Enclosed Type Weatherproof Bells

VIBRATING—N. E. C. STANDARD

Non-Guarded

Recommended where bells are exposed to dust, dampness or mechanical injury. Regularly furnished with platinoid contacts. Equipped with high power armature. Breakage of tension spring does not disable bell.

FOR BATTERY OR D. C. COMMERCIAL CIRCUITS

Model "A" Non-Guarded Type

Furnished for specified battery voltage or 110 or 220 volts D. C. as specified, except No. A-1¼ to A-3, which are furnished for battery operation only.

No. A-1¼. Non-Guarded Bell, 1¼″ gong.
No. A-2. Non-Guarded Bell, 2″ gong.
No. A-3. Non-Guarded Bell, 3″ gong.
No. A-4. Non-Guarded Bell, 4″ gong.
No. A-5. Non-Guarded Bell, 5″ gong.
No. A-6. Non-Guarded Bell, 6″ gong.
No. A-8. Non-Guarded Bell, 8″ gong.
No. A-10. Non-Guarded Bell, 10″ gong.
No. A-12. Non-Guarded Bell, 12″ gong.
No. A-14. Non-Guarded Bell, 14″ gong.
No. A-16. Non-Guarded Bell, 16″ gong.
No. A-18. Non-Guarded Bell, 18″ gong.

No. C-4. Full-Grid Bell, 4″ gong.
No. C-5. Full-Grid Bell, 5″ gong.
No. C-6. Full-Grid Bell, 6″ gong.
No. C-8. Full-Grid Bell, 8″ gong.
No. C-10. Full-Grid Bell, 10″ gong.
No. C-12. Full-Grid Bell, 12″ gong.

Full Grid-Guarded

FOR TRANSFORMER AND A. C. LIGHT OR POWER CIRCUITS

When ordering, specify operating voltage and frequency. Designed for 12 to 18 volts, 50-60 cycles; 110 or 220 volts, 60 cycle commercial circuits.

No. AT-4. Non-Guarded Bell, 4″ gong.
No. AT-5. Non-Guarded Bell, 5″ gong.
No. AT-6. Non-Guarded Bell, 6″ gong.
No. AT-8. Non-Guarded Bell, 8″ gong.
No. AT-10. Non-Guarded Bell, 10″ gong.
No. AT-12. Non-Guarded Bell, 12″ gong.

No. CT-4. Full-Grid Bell, 4″ gong.
No. CT-5. Full-Grid Bell, 5″ gong.
No. CT-6. Full-Grid Bell, 6″ gong.
No. CT-8. Full-Grid Bell, 8″ gong.
No. CT-10. Full-Grid Bell, 10″ gong.
No. CT-12. Full-Grid Bell, 12″ gong.

Digitized by Google

Enclosed Type Buzzers

N. E. C. STANDARD—WEATHERPROOF

Heavy frame, gasket cover, moisture and dustproof. Platinoid contacts, side contact adjustment of micrometer-lock type. Absolutely dependable. Terminals mounted on Bakelite. Mechanism insulated from frame. High power armatures.

No. 93. Enclosed type Buzzer for battery circuits or 12-18 volt transformer. (Specify voltage or voltage and frequency.)

No. 101. Enclosed type Buzzer for battery circuits, 12-18 volt transformer, 110 volt D. C. or 110 volt A. C. commercial circuits. (Specify voltage or voltage and frequency.)

Underdome Enclosed Type Bells

N. E. C. STANDARD—WEATHERPROOF

For Battery, Transformer and Commercial Circuits

The mechanisms of these bells are self contained; protected by the gong and base casting. Battery and D. C. types have long, multi-gear pattern armature, giving a slow, dignified sound wave of great power.

Transformer and A. C. types have no contacts whatever and are absolutely non-arcing. They vibrate in unison with the frequency of the supply source and are so rapid that they can be used for code signaling just as satisfactorily as single stroke bells. The volume of sound is many times greater than other bells of same size.

Non-Conduit Type

FOR BATTERY AND COMMERCIAL D. C. CIRCUITS

Specify Voltage When Ordering

No. U-8. Non-conduit type, D. C. Underdome bell, 8″ gong.

No. U-10. Non-conduit type, D. C. Underdome bell, 10″ gong.

No. UP-8. Surface conduit type, D. C. Underdome bell, 8″ gong.

No. UP-10. Surface conduit type, D. C. Underdome bell, 10″ gong.

No. UF-8. Flush conduit type, D. C. Underdome bell, 8″ gong.

No. UF-10. Flush conduit type, D. C. Underdome bell, 10″ gong.

Conduit Pattern

FOR 12-18 VOLT TRANSFORMER AND COMMERCIAL A. C. CIRCUITS

Specify Voltage and Frequency When Ordering

No. UT-8. Non-conduit type, A. C. Underdome bell, 8″ gong.

No. UT-10. Non-conduit type, A. C. Underdome bell, 10″ gong.

No. UTP-8. Surface conduit type, A. C. Underdome bell, 8″ gong.

No. UTP-10. Surface conduit type, A. C. Underdome bell, 10″ gong.

No. UTFP-8. Flush conduit type, A. C. Underdome bell, 8″ gong.

No. UTFP-10. Flush conduit type, A. C. Underdome bell, 10″ gong.

Digitized by Google

Cyclone Electric Bells

APPROVED BY NATIONAL BOARD OF FIRE UNDERWRITERS

Type 6. D. C.
Type 7. A. C.

VIBRATING PLUNGER TYPE FOR DIRECT CURRENT ONLY

Furnished with special steel gongs 6", 8", 10" or 12" in diameter, with bell metal gongs 6", 8", 10" in diameter or 3"x5" cow gongs as specified. When ordering, specify type number, style of gong and resistance or operating voltage. (See Table.)

Type 6 is designed for battery current of 30 volts or less only. Has exposed terminals.

Type 6-C is designed for battery operation of 30 volts or less or 110 or 220 volts direct current commercial circuits. Frame is tapped for ½" conduit. Thoroughly dust, bug and moisture-proof.

Type 6-F is weather-proof and requires no protection from the elements. Frame is heavy cast iron finished with enamel over a rust-proof coat of primer. Rubber gaskets are used to seal the cover to the frame which is tapped for ½" conduit connection in top and with knockout cap in the back. Terminals are within the case. Heavily insulated from the frame to permit mounting on bridges, iron posts and other conducting structures. Special steel gongs finished in nickel, brass or galvanized plate or oxidized furnished as standard. Bell metal gongs furnished when specified.

Type 62 is an Underdome type of D. C. bell with cast metal frame tapped for ½" conduit and provided with holes for entrance of line wires. Plugs are furnished for holes not in use. Bell is bug, dust and weather-proof. Equipped with 8" special steel gong only.

Type 6-C and 6-F. D. C.
Type 7-C. A. C.

FOR TRANSFORMER AND COMMERCIAL A. C. CIRCUITS

Specify Voltage and Frequency When Ordering

Type 7, similar to Type 6, except designed for use on transformers or commercial A. C. circuits of 110 or 220 volts. Furnished 6", 8" and 10" and 3"x5" cow gongs only.

Type 7-C, similar to Type 6-C, with same exceptions that apply to Type 7 as given above.

Type 72, similar to Type 62, except for A. C. operation.

Type 75

Type 75 is a small A. C. bell furnished with 3", 4" or 5" bell metal gongs and 4" or 5" steel gongs as specified. For transformer or 110 volt or 220 volt operation.

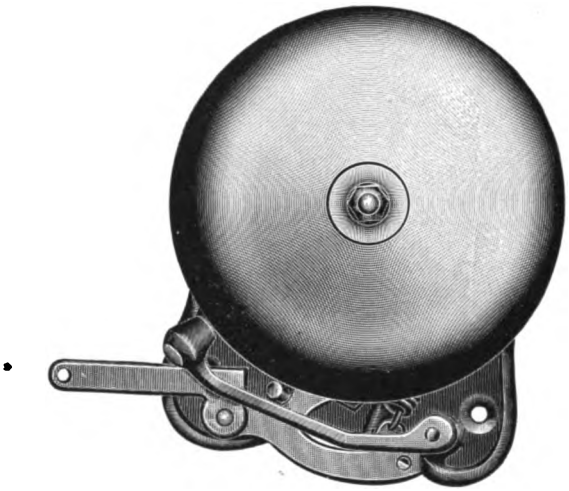
Type 62. D. C.
Type 72. A. C.

TABLES OF RESISTANCE AND CURRENT RATINGS

Operating Voltage	Nos. 6, 6-C, 6-F and 62—D. C. Resistance Ohms	Current Amps.	Nos. 7, 7-C and 72—A. C. Resistance Ohms	Current Amps.	No. 75 —A. C. Resistance Ohms	Current Amps.
4-5	6	.3	3	.5	1.5	.48
6-7	10	.2	4	.33	2.8	.42
8-9	15	.2	5	.25	4.8	.37
10-13	25	.2	7	.25	7.	.32
14-17	35	.25	10	.25	16.	.25
18-23	50	.3	15	.23	26.	.19
24-30	125	.2	25	.22	48.	.12
100-115	350	.25	250	.1	400.	.05
220-250	950	.25	500	.1	1000.	.03

Digitized by Google

Hand Trip Bell



For many purposes a hand trip signal is more desirable and economical than one electrically operated.

These bells are furnished with polished bell metal gongs 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16 or 18″ in diameter. Bells with brass or sheet steel gongs 3, 4, 5, 6, 7, 8, 10, or 12″ can also be furnished when specified. All bells having gongs 8″ or less in diameter are furnished with metal hammers and bells of larger diameter are furnished with wood hammers.

No. 411. Hand trip bell. (Specify diameter and kind of gong.)

No. 200 Hand Trip Attachment

No. 200. Hand Trip

The Hand Trip Attachment was developed so that mechanical operation would be assured in case of failure of the electric current supply. Desirable for use in mines and other places where signals must be given and cannot be entirely dependent on electric circuits. May be furnished on any bell of 6, 8, 10, 12, 14, 16, or 18″ gong diameter.

Digitized by Google

Section 3

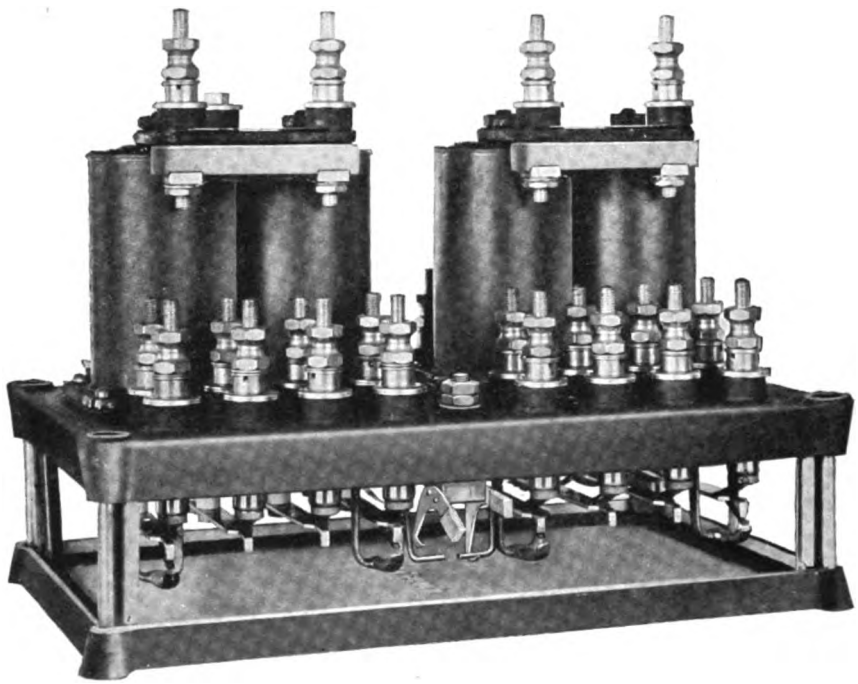
Contents

RELAYS
RAIL CONTACTS
FLASHERS
ANNUNCIATORS
"AUTOFLAG" TEST BOX
PUSH BUTTONS
KNIFE SWITCHES
TESTING JACKS
TEST KEYS
EMERGENCY RELEASE SWITCH
CONDENSERS
FUSE BLOCKS AND CLIPS
SIGNAL COUNTERS

Digitized by Google

Interlocking Relay No. 1073

A. R. A. SPECIFICATIONS



This relay is of standard construction and in accordance with A. R. A. specifications. Coils are form wound. The flexible connections are of ribbon copper. Binding posts are non-turning and all parts are rigidly locked in place.

The interlocking feature is extremely simple and consists of two flat brass hooks mounted between the halves of the relay. An arm attached to each armature engages the hooks in such a way that the well known feature of directional operation is secured.

The ruggedness and simplicity of this interlocking feature insures its reliability at all times.

The interlocking parts are not used as a part of the circuit in this relay. Standard relay fingers and posts are used for all circuits.

Any number of contacts up to four front and four back on each end can be furnished.

The standard resistance is 4 ohms but any resistance up to 1,000 ohms can be furnished if desired.

The over-all dimensions are 11⅞" long, 7¼" wide and 9¼" high.

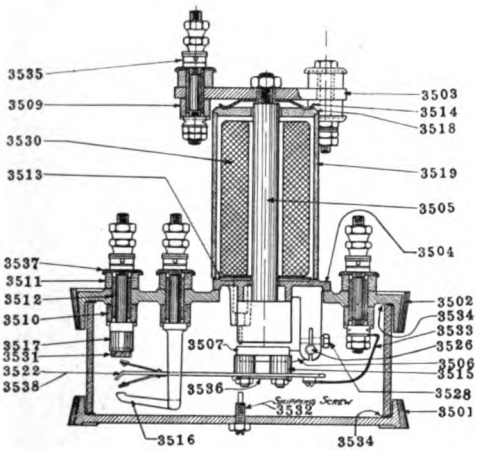
Description

No. 1073. Interlocking Relay (specify resistance per pair of coils and number of contacts for each end).

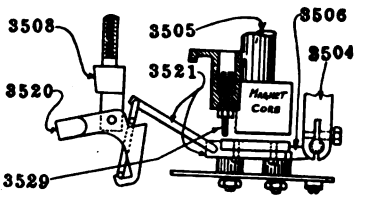
Digitized by Google

Interlocking Relay No. 1073

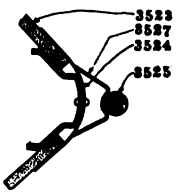
REPAIR PARTS



Typical Section



Interlocking Parts



Vertical Section of Corner

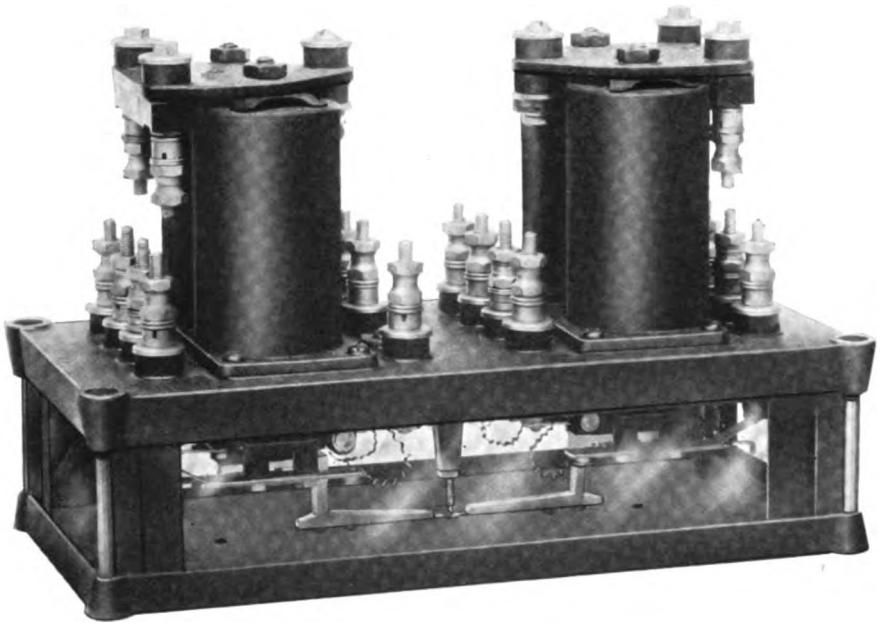
No.	Description
3501.	Base.
3502.	Top plate.
3503.	Coil yoke.
3504.	Core support.
3505.	Magnet core.
3506.	Hinge.
3507.	Armature.
3508.	Interlocking support.
3509.	Binding post insulating block.
3510.	Contact insulating block.
3511.	Insulating bushing.
3512.	Insulating sleeve.
3513.	Insulating washer.
3514.	Spring washer.
3515.	Insulating support.
3516.	Back contact post.
3517.	Front contact post.
3518.	Coil shell cap.
3519.	Coil shell.
3520.	Interlocking hook.

No.	Description
3521.	Interlocking finger.
3522.	Contact finger, complete with front and back springs.
3523.	Glass (specify end or side piece).
3524.	Corner support.
3525.	Corner screw.
3526.	Trunnion.
3527.	Corner brace.
3528.	Hexagon head screw.
3529.	Adjustable stop.
3530.	Magnet coils (Order in pairs. Specify resistance per pair).
3531.	Front contact graphite.
3532.	Shipping screw.
3533.	Heel cord.
3534.	Cork gasket.
3535.	Slotted nut.
3536.	Lock plate.
3537.	Cup washer.
3538.	Contact finger with front spring only.

Digitized by Google

Interlocking Relay No. 1070-H

A. R. A. SPECIFICATIONS



The Number 1070-H Relay is of standard construction and in accordance with A. R. A. specifications. Binding posts are non-turning and all parts are firmly locked in place. Flexible connections are of ribbon copper.

The interlocking device, which is rugged and reliable, has been used for years in various adaptations and has proved to be a very satisfactory interlocking feature.

In addition to the interlocking contact, which is also the bell ringing contact, three front or three back contacts on each end, or any combination of front and back contacts, not exceeding three contacts on each end, can be furnished.

The standard resistance is 4 ohms, but any resistance up to 500 ohms per pair of coils can be furnished as specified.

The overall dimensions of this relay are 12⅜" long, 6¼" wide and 8¼" high.

Note—When ordering Number 1070-H Relays, specify resistance of each pair of coils and number of front and back contacts required on each end. More than one interlocking contact can be furnished if required.

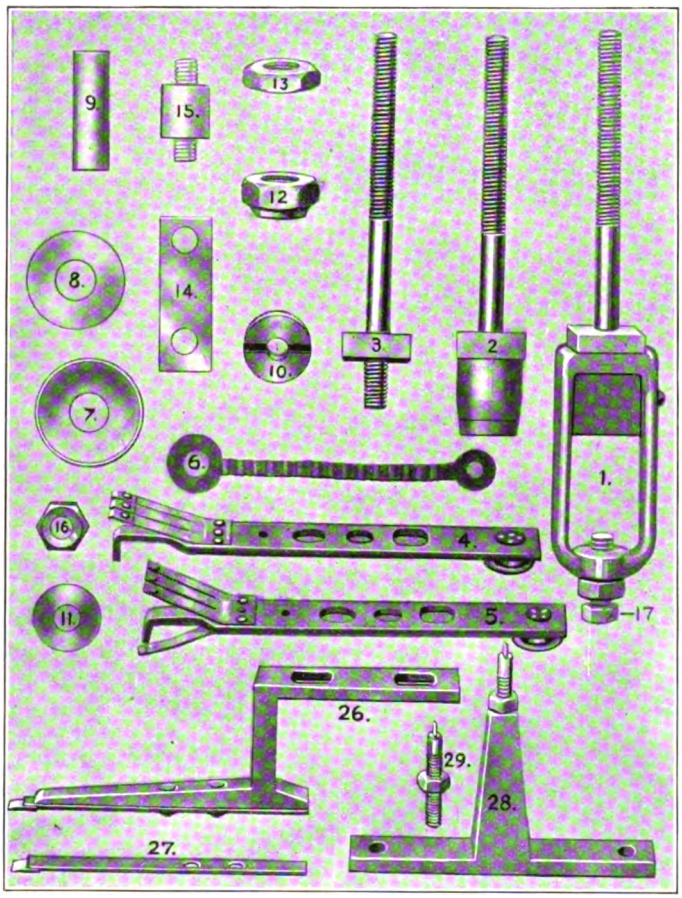
Description

No. 1070-H. Interlocking Relay (specify resistance per pair of coils and number of contacts for each end).

Digitized by Google

Interlocking Relay No. 1070-H

CONTACT PARTS

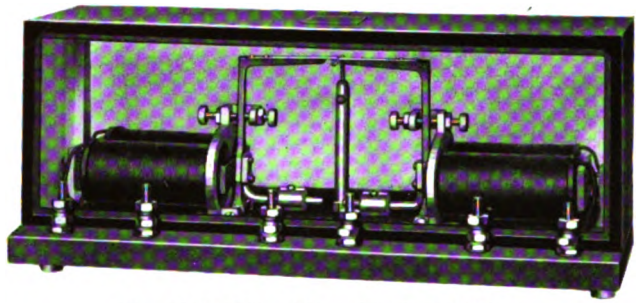


No.	Description
BH-1.	Back contact post, complete with contact screw.
BH-2.	Graphite front contact post.
BH-3.	Heel post.
BH-4.	Front contact finger.
BH-5.	Back contact finger.
BH-6.	Copper ribbon, flexible connection.
BH-7.	Cup washer.
BH-8.	Insulating washer.
BH-9.	Insulating sleeve.
BH-10.	Slotted nut.
BH-11.	Brass washer.
BH-12.	A. R. A. hexagon nut.

No.	Description
BH-13.	A. R. A. thin hexagon nut.
BH-14.	Lock plate.
BH-15.	Insulating support.
BH-16.	Small hexagon brass nut.
BH-17.	Contact screw and nut for post No. 1.
BH-26.	Interlocking contact support, complete with contact.
BH-27.	Interlocking contact finger only.
BH-28.	Interlocking contact post, complete with contact screws.
BH-29.	Contact screw and nut for post No. 28.

Digitized by Google

Style "H" Interlocking Relay



No. H-75-SS. Glass Enclosed Type
(Design Patents Pending)

The Style "H" Relay has made an enviable reputation for itself by many years of successful service on practically all the railroad systems of this country. Its simplicity and ruggedness of construction make it the ideal relay for the control of crossing bells, Auto-flags, Wig-Wags, Flashing Light Signals, etc.

In the original design no provision was made to enclose the contacts and other moving parts to protect them from dust or to prevent unauthorized adjustment. Realizing the advantage of having contacts fully protected and the adjustment features so enclosed that they are under seal, we have developed a glass cover for the style "H" relay, all adjustments made and sealed in accordance with A. R. A. specifications.

In arranging the design no alterations have been made in the contact arrangement or moving parts. The width of the base has been slightly increased to provide room for spacing the terminal posts outside the cover and in front of the relay where they are most convenient for installation.

The relay without glass cover is still furnished if the improved style is not required. We are also prepared to furnish the cover and base only so that they may be applied to relays in service. This change can be made readily in any repair shop.

When ordering specify resistance of coils.

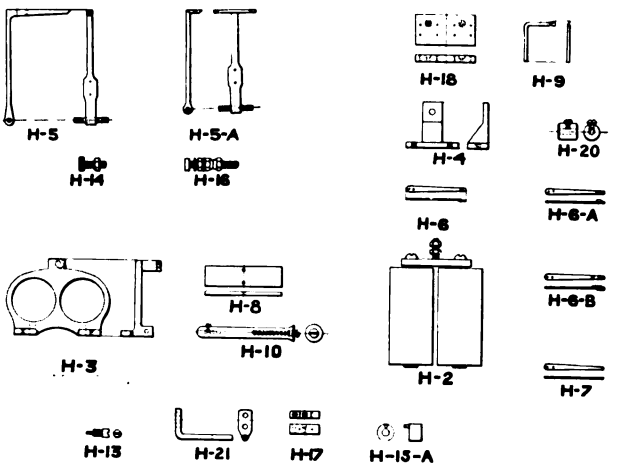
DESCRIPTION

No. H-75.	Standard Style "H" Single Track Interlocking Relay. Closed Circuit Type.
No. H-75-SS.	Same as above—Glass Enclosed. (Illustrated.)
No. H-76.	Standard Style "H" Double Track Non-interlocking Relay.
No. H-76-SS.	Same as above—Glass Enclosed.
No. H-30.	Standard Style "H" Single Track Interlocking Relay. Open Circuit Type.
No. H-30-SS.	Same as above—Glass Enclosed.

Digitized by Google

Style "H" Interlocking Relay

REPAIR PARTS



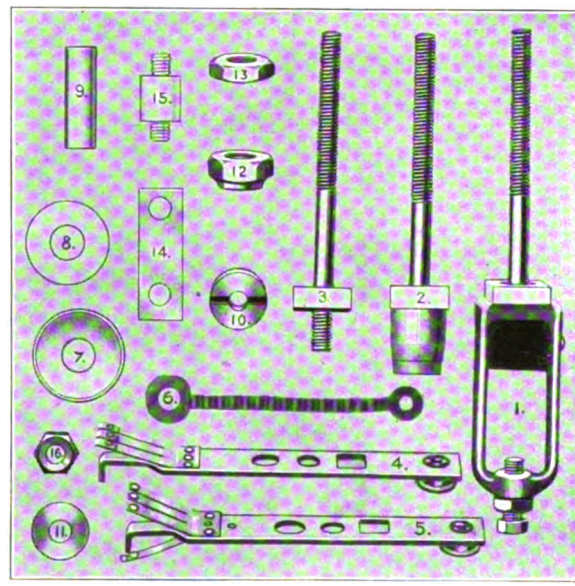
No.	Description
H-2.	Magnet, complete. (Specify resistance.)
H-3.	Magnet frame with screws. (Specify right or left.)
H-4.	Magnet support with screws.
H-5.	Armature carriage with axle and screws.
H-5-A.	Special armature carriage with axle and screws.
H-6.	Silver pointed contact spring.
H-6-A.	Bone pointed contact spring.
H-6-B.	Silver bone pointed contact spring.
H-7.	Contact spring support.
H-8.	Armature.
H-9.	Silver pointed contact bar for interlocking contact.
H-10.	Back contact post with screws.
H-13.	Armature trunnion screw.
H-14.	Adjusting screw with nut.
H-15.	Base leg.
H-15-A.	Base leg for glass enclosed type.
H-16.	Binding post, complete with nuts and washers.
H-17.	Contact block for extra contact.
H-18.	Contact block for extra contact. (Used with H-5-A.)
H-20.	Counterweight and screw.
H-21.	Counterweight bracket.

Digitized by Google

Contact Parts for Interlocking Relay No. 30130

(Manufacture Discontinued)

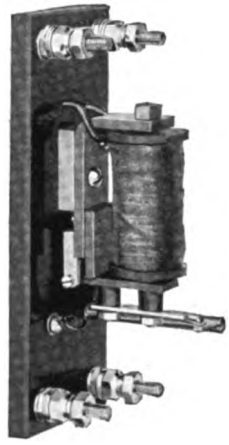
A. R. A. SPECIFICATIONS



No.	Description
30-1.	Back contact post.
30-2.	Graphite front contact post.
30-3.	Heel post.
30-4.	Front contact finger.
30-5.	Back contact finger.
30-6.	Copper ribbon flexible connection.
30-7.	Cup washer.
30-8.	Insulating bushing.
30-9.	Insulating sleeve.
30-10.	Slotted nut.
30-11.	Brass washer.
30-12.	A. R. A. hexagon nut.
30-13.	A.R.A. thin hexagon nut.
30-14.	Lock plate.
30-15.	Insulating support.
30-16.	Small hexagon nut.
30-17.	Contact screw and nut for post No. 1.
30-18.	Brass interlocking hook.
30-19.	Aluminum interlocking arm.

Digitized by Google

One Point Relay



Until recently it has been necessary to invest in large neutral relays even though only one point of the relay was needed.

Our No. 2105 One Point Neutral Relay is small enough to permit of mounting on the back of a relay box between two standard relays. It meets every requirement for safety circuits, yet costs about half of the price of a neutral relay of the standard design.

It can be furnished with the coil wound to any specified resistance to meet standard specifications. It may be equipped with one front contact only, one back contact only or with one front and one back dependent contact as desired.

It is ideal for use as a repeater relay for indicator circuits, for lighting purposes and many other services where one front and one back contact is sufficient.

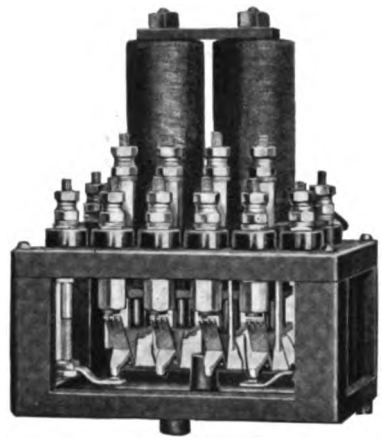
When ordering specify the resistance desired or the current on which the relay must operate and the maximum resistance acceptable as well as the contacts needed.

No. 2105. One Point Neutral Relay (specify resistance or working current and contacts desired).

Digitized by Google

No. 3700 Neutral Relay

TYPE "BL"



The type "BL" Neutral relay incorporates many features of design which make it one of the best on the market. The moulded Bakelite top and bottom plates are recessed and provided with inserts eliminating many small parts which go into relays of ordinary construction.

The die cast contact fingers absolutely do not change in years of service. Both the front and back contact posts are adjustable, obviating the necessity of bending fingers to get uniform adjustment. Contact springs are of phosphor bronze tipped with silver, platinum or other specified material and are of conventional design.

The cores, armatures and yoke are of special imported iron and are of ample size to provide an efficient magnetic circuit. All brass parts are nickeled and iron parts are treated to prevent corrosion and rust.

Details of the outstanding features of design can be seen by reference to the typical section shown in connection with the parts list on the opposite page.

Any number of contacts up to four front and two back can be furnished as specified. Coils of any resistance from 1.9 ohms to 1000 ohms will be furnished.

DESCRIPTION

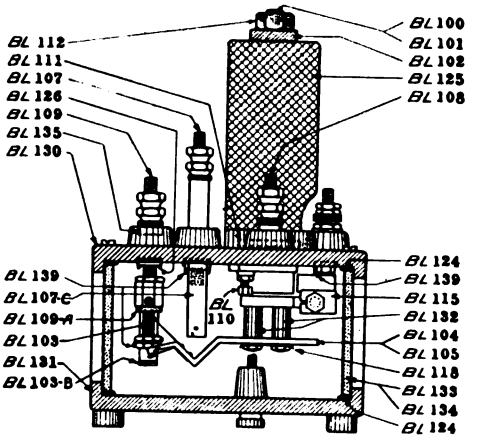
No. 3700. Type "BL" Neutral Relay (specify resistance and number of contacts).

Digitized by Google

No. 3700 Neutral Relay

TYPE "BL"

REPAIR PARTS

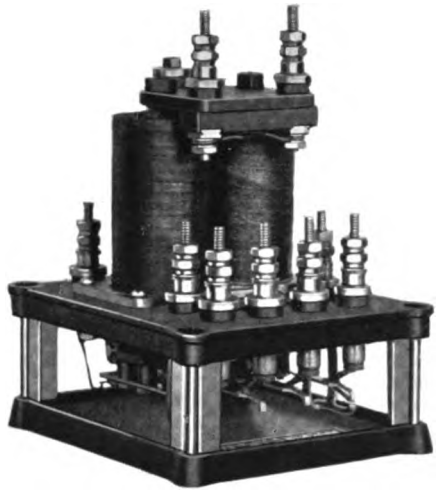


No.	Description
BL-100.	Right hand core.
BL-101.	Left hand core.
BL-102.	Yoke.
BL-103.	Back contact post.
BL-103-B.	Back contact.
BL-104.	Contact finger with front contact spring.
BL-105.	Contact finger with front and back contact springs.
BL-107.	Heel terminal post.
BL-107-C.	Heel terminal strip.
BL-108.	Coil terminal post.
BL-109.	Front contact post, complete less carbon.
BL-109-A.	Front contact carbon only.
BL-110.	Armature stop pin.

No.	Description
BL-111.	Brass retaining nut.
BL-112.	⅜" core nuts.
BL-115.	Armature assembly, complete.
BL-118.	Lock washer.
BL-124.	Cork gasket.
BL-125.	Magnet coil (specify resistance per pair).
BL-126.	Lock washer.
BL-130.	Bakelite top.
BL-131.	Bakelite base.
BL-132.	Bakelite insert.
BL-133.	End glass.
BL-134.	Front or back glass.
BL-135.	Square nut.
BL-139.	Lock washer.

Digitized by Google

No. 3590 Neutral Relay



This Neutral relay is similar, in design and construction, to our well-known and widely used No. 1073 Interlocking relay. Contact parts of the two relays are interchangeable.

The relay meets A. R. A., signal section specifications. Coils are form wound, front contacts are graphite, back contacts and contact fingers are silver unless platinum or other material is specified.

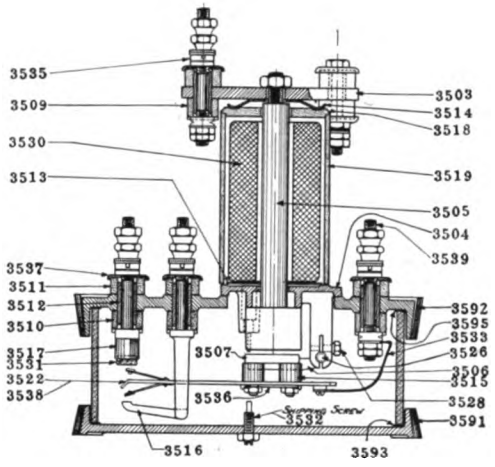
Any number of contacts up to four front and four back can be furnished and coils will be wound to any specified resistance from 1.9 ohms to 1000 ohms per pair.

No. 3590. Neutral relay (specify resistance and number of front and back contacts).

Digitized by Google

No. 3590 Neutral Relay

REPAIR PARTS



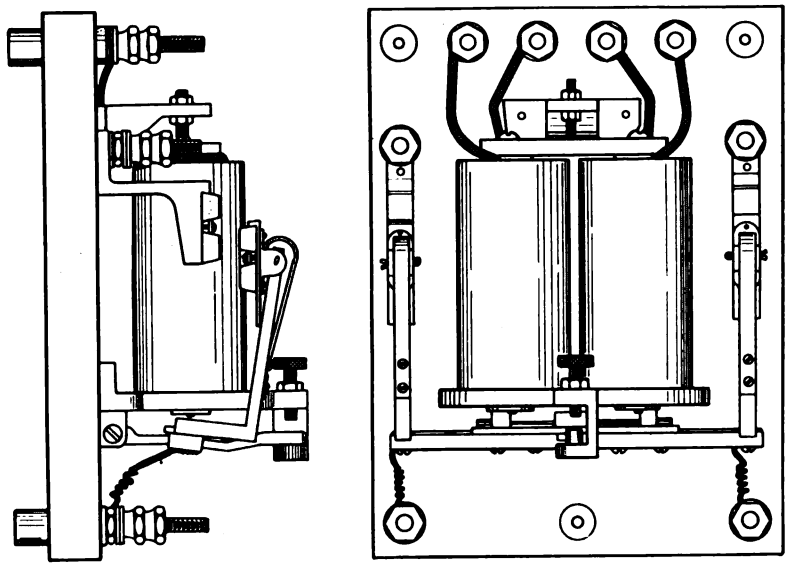
No.	Description
3503.	Coil yoke.
3504.	Core support.
3505.	Magnet core.
3506.	Hinge.
3507.	Armature.
3509.	Binding post insulating block.
3510.	Contact insulating block.
3511.	Insulating bushing.
3512.	Insulating sleeve.
3513.	Insulating washer.
3514.	Spring washer.
3515.	Insulating support.
3516.	Back contact post.
3517.	Front contact post.
3518.	Coil shell cap.
3519.	Coil shell.

No.	Description
3522.	Contact finger, complete with front and back springs.
3526.	Trunnion.
3528.	Hexagon head screw.
3530.	Magnet coils (specify resistance per pair).
3531.	Front contact graphite.
3532.	Shipping screw.
3533.	Heel cord.
3535.	Slotted nut.
3536.	Lock plate.
3537.	Cup washer.
3538.	Contact finger with front spring only.
3591.	Base.
3592.	Top plate.
3593.	Cork gasket.

Digitized by Google

Style "QX" Relay

FOR BREAKING HEAVY CURRENTS



The style "QX" relay has been designed for making and breaking comparatively heavy currents. Two independent front contacts are provided to open both sides of a circuit. The contacts will handle 20 amperes at 110 volts, 10 amperes at 220 volts or 5 amperes at 600 volts direct current.

Ingeniously arranged contacts cause the make and break of the circuit to come on carbon to carbon surfaces which prevent burning or fusing by the arc. After the carbons have closed the circuit, cophite contacts come together providing low resistance contacting surfaces of large area to carry the current. As the cophite to cophite contacts never make or break the circuit they are not subject to arcing and therefore do not pit or burn and positively will not fuse, increase in contact resistance or heat.

Coils can be arranged for operation from any direct current source up to 600 volts as specified.

The relays are wall mounting and will be found useful for remote control of small pump motors, motor-generator sets and similar services.

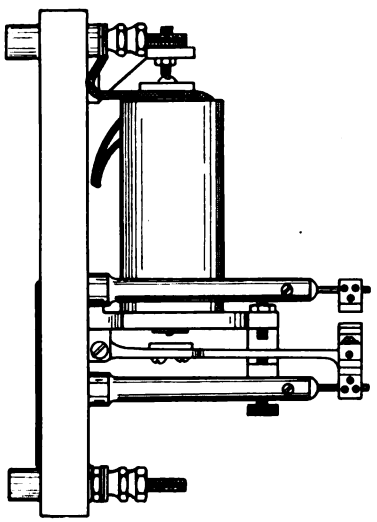
Description

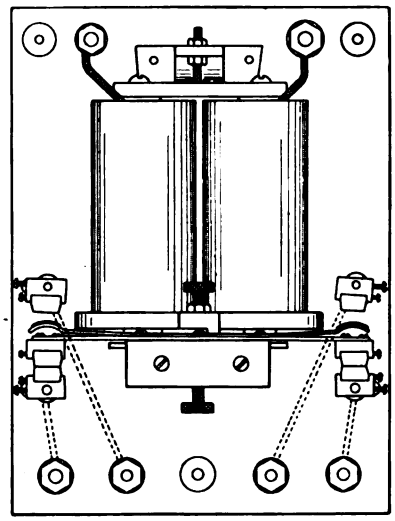
No. C-66. Style "QX" double contact, direct current relay. (Specify voltage on which relay is to operate.)

Digitized by Google

Style "QW" Relay

FOR HIGH VOLTAGE





The style "QW" relay was primarily designed to break high voltage circuits. The circuit is broken in two places to provide the requisite contact opening and yet keep the travel of the armature and length of contact fingers within reasonable limits.

The two contacts are permanently connected in series to open and close 600 volt circuits having up to 10 amperes flowing. The contacts are equivalent to one front and back dependent contact. Front contacts are cophite to silver and back contacts are cophite to cophite. There is no danger of pitting or fusing of the contacts and due to the construction of the contact finger and stationary contacts, a sufficient wipe or slide is introduced to insure clean ample contracting surfaces.

The relay opens but one side of a circuit. It can be used for either A. C. or D. C. circuits up to 600 volts although coils are for operation on specified direct current sources only up to 600 volts. This relay is for wall mounting and is frequently used for remote control of motor driven apparatus, lighting, etc.

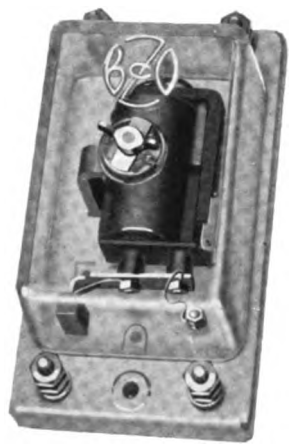
Description

No. C-67. Style "QW" direct current, series contact relay (specify voltage on which relay is to operate).

Digitized by Google

Series Line Relay No. 2100

FOR APPROACH LIGHTING



The economy of electrically lighting signal lamps on the approach of trains has been demonstrated by the many installations in which the No. 2100 Series Line Relay has been used.

This relay is placed in the line circuit and the lighting circuit carried through the back contact.

In many cases no additional battery is required in the line circuit for the operation of the relay.

When it is desired to use this relay as a one point neutral relay it can be furnished with Front and Back contact, Front contact only or Back contact only.

The coil can be wound to any specified resistance up to 1000 ohms.

Description

No. 2100. Series Line Relay with one back contact.

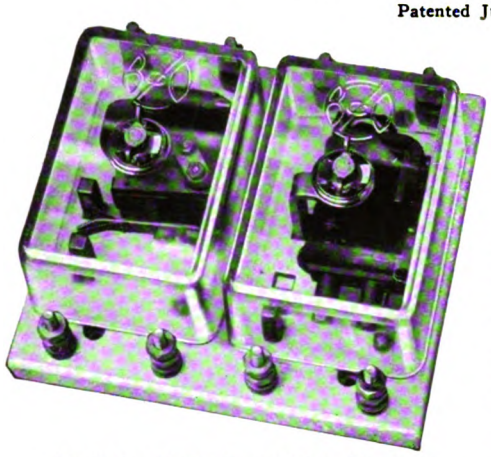
No. 2100A. Series Line Relay with one front contact.

No. 2100B. Series Line Relay with one front and one back dependent contact.

Digitized by Google

Power-Off and Series Line Relay

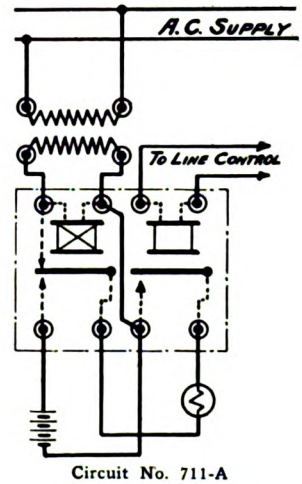
Patented July 23, 1925



No. 2106. Power-off and Series Line Relay

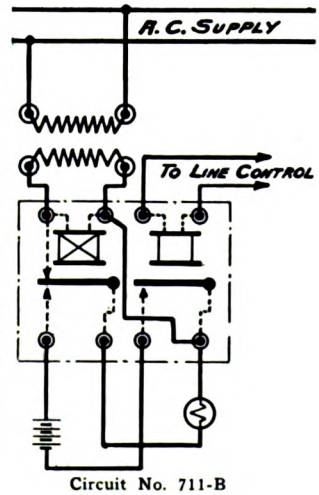
RELAY CONTACT CAPACITY 10 AMPERES Continuously

The No. 2106 Power-off and Series Line Lighting Relay provides an A. C. Power-off Relay which normally allows low voltage alternating current to supply the lighting circuit and automatically connects the lighting circuit to a reserve source in case of A. C. power failure and a Series Line Lighting Relay to be used for approach lighting of signal lamps.



Circuit No. 711-A

When connected as shown in circuit No. 711-A, the lamps are lighted upon the approach of a train when being energized from either the normal or reserve source of power, but when connected in accordance with circuit No. 711-B the lamps burn continuously on the normal source and are approach lighted only when the light circuit is connected to the reserve power supply.



Circuit No. 711-B

The relay base, of porcelain, is provided with mounting holes so spaced, that it may be mounted either on the relay compartment wall or on the front of our type No. 52 Lighting Transformer, described on page 233. This provision conserves space, making it possible to mount both transformer and relay on wall space necessary for the relay only.

When Ordering, It Is Necessary to Specify:

The A. C. voltage for which the Power-off Relay Coil is to be wound, which should be same as normal lamp voltage. (See circuits.)

The resistance or other characteristics of the Series Line Relay.

If transformer is desired, specify primary voltage and frequency, secondary capacity of 40 watts or 80 watts and secondary voltages.

For convenience in ordering, sample specifications are given:

Description

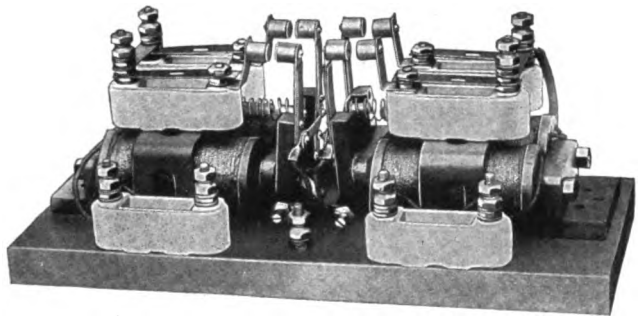
No. 2106. Power-off and Series Line Lighting Relay with A. C. relay coil wound for operation on 10 volts 60 cycle and Series Line Relay Coil wound to 150 ohms resistance.

No. 52. Lighting Transformer, primary 100-115 volts, 60 cycles secondary, 9, 10 and 11 volts, capacity 40 watts. (See page 233.)

Digitized by Google

High Voltage Relays

No. 12 for Single Track **No. 24 for Double Track**



No. 24

These relays are designed for controlling the operation of crossing signals, alarms, etc., on ELECTRIC RAILROADS and are constructed to handle any voltage up to 600 volts.

Simplicity, ruggedness and reliability are the salient features of these relays.

There are two sets of magnet coils, each having its own armature. On the armature are mounted two contact fingers which make connection with the stationary contact fingers that are mounted above the coils.

Each set of coils and contacts are entirely separate so that these relays can be used for controlling signals on double track roads. All parts are properly spaced and insulated to withstand the severe conditions met with in this class of service.

For operation on 600 volt circuits it is necessary to use one 1500 ohm resistance unit in series with each set of magnets. Two 1500 ohm units with mountings are furnished with each relay.

Size overall: 14″ long, 6¼″ wide and 6″ high.

Description

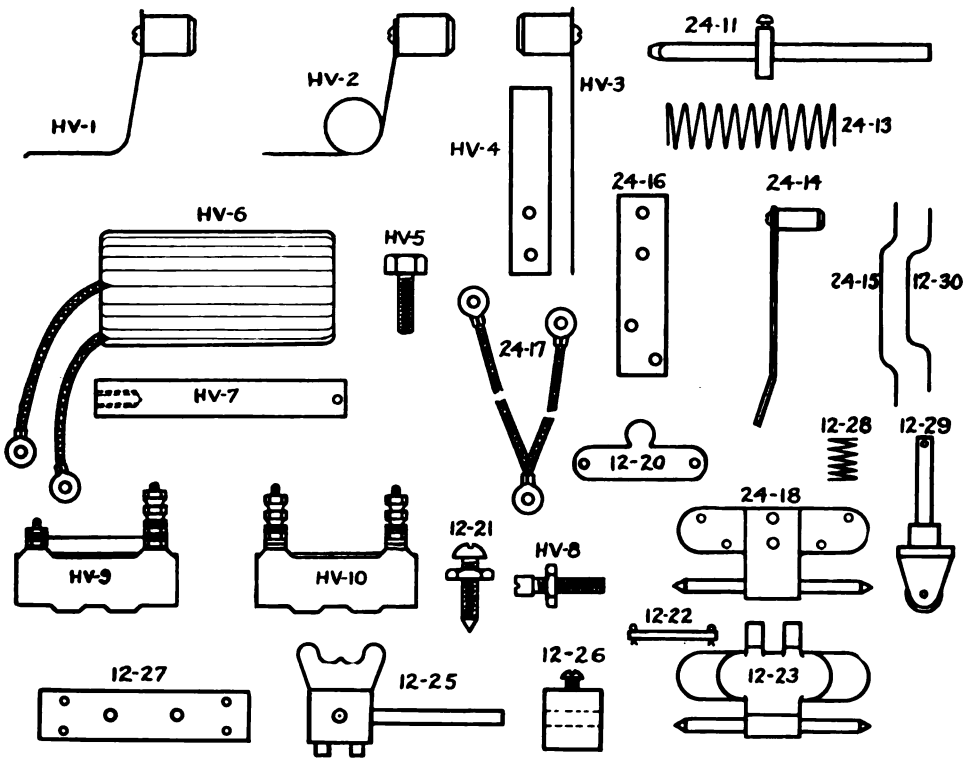
No. 12. High voltage relay for single track, complete with resistance units and bases.

No. 24. High voltage relay for double track, complete with resistance units and bases.

Digitized by Google

High Voltage Relays No. 12 and No. 24

REPAIR PARTS

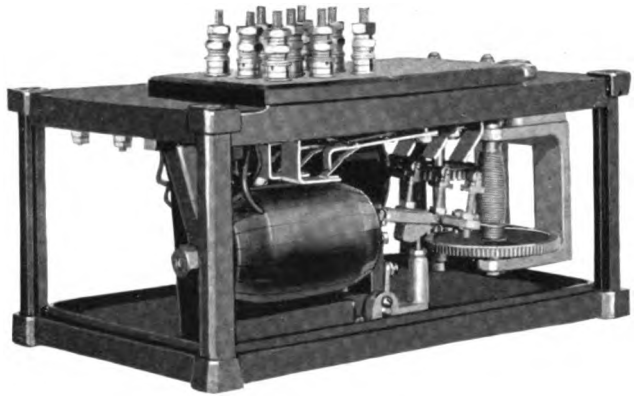


No.	Description
H. V.- 1.	Stationary contact (phosphor bronze spring).
H. V.- 2.	Stationary contact (brass wire spring).
H. V.- 3.	Moving contact.
H. V.- 4.	Moving contact reinforcement.
H. V.- 5.	Core supporting cap screw.
H. V.- 6.	Magnet coil.
H. V.- 7.	Magnet core.
H. V.- 8.	Armature trunnion screw.
H. V.- 9.	Contact terminal block.
H. V.-10.	Main terminal block.
24-11.	Spring support and adjustment collar, complete.
24-13.	Tension spring.
24-14.	Back stop.
24-15.	Contact connecting strap.
24-16.	Insulating contact support.
24-17.	Flexible connection.
24-18.	Double track armature.
12-20.	Single track armature link.
12-21.	Regulator trunnion screw.
12-22.	Link pin.
12-23.	Single track armature.
12-25.	Single track regulator.
12-26.	Regulator weight.
12-27.	Single track contact insulating support.
12-28.	Regulator spring.
12-29.	Regulator roller.
12-30.	Single track contact connecting strap.
H. V.-1500.	Resistance unit only, ferrule type.
H. V.-1510.	Mounting for resistance unit.

Digitized by Google

Time Relay

TYPE No. 3200



The type No. 3200 Time Relay may be used with crossing protection devices when it is desired to stop the warning signals after a predetermined time or for energizing certain circuits after an elapsed time after the time relay has been energized. Many uses will suggest themselves and we will be glad to give detailed information concerning its application to any particular problem, which may be under consideration.

The relay is equipped with two Front and two Back contacts to either open or close circuits, as desired, after a predetermined time.

When energy is applied to the relay, a motor, through a train of gears, slowly rotates a vertical threaded post and a metal hook engages in the threads and is raised until, after the predetermined time has elapsed, the contacts are opened or closed as the case may be. After the movement of the contacts has been accomplished the mechanism is automatically stopped, but the slot coil remains energized until all energy is cut off from the relay, allowing the mechanism to return immediately to its normal position, ready for the next operation.

Three styles are available as follows:

No. 3200-6. Time Relay for operation on 6 volts D. C., adjustable for from 10 seconds to 2 minutes.

No. 3200-9. Time Relay for operation on 6 volts D. C., adjustable for from 2 minutes to 5 minutes.

No. 3200-18. Time Relay for operation on 6 volts D. C., adjustable for from 2½ minutes to 7½ minutes.

When ordering, specify the time adjustment desired and whether contacts are to be made or broken after the elapsed time.

Special conditions can be met. **(See also Time Relay on page 108.)**

Digitized by Google

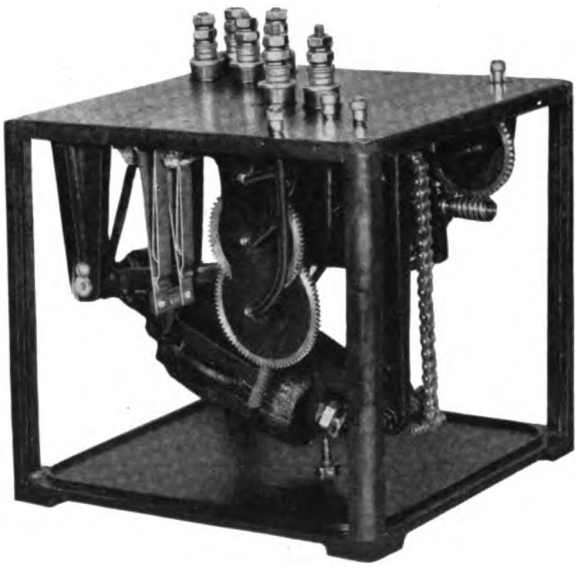
Time Relay No. 3200

REPAIR PARTS

No.	Description
3202-1.	Top plate.
3203-6.	Time screw, triple thread —6 threads to the inch for 10 seconds to 2½ minutes' time adjustment.
3203-9.	Time screw, double thread—9 threads to the inch, for 2 minutes' to 5 minutes' time adjustment.
3203-10.	Worm gear shaft.
3203-11.	Steel bushing.
3203-12.	Contact finger bracket.
3203-14.	Spur gear.
3203-15.	Spur pinion.
3203-16.	Worm gear.
3203-17.	Driving worm.
3203-18.	Time screw, single thread —18 threads to the inch, for 2½ minutes to 7½ minutes' time adjustment.
3203-19.	Bearing for worm gear shaft.
3203-20.	Armature trunnion.
3203-21.	Oil well.
3203-23.	Heel post.
3203-24.	Contact finger mount.
3203-25.	Lifter, complete.
3203-26.	Back contact.
3203-27.	Back contact post.
3203-28.	Terminal plate, complete with terminals.
3203-29.	Insulation plate.
3203-31.	Short oil tube with cap.
3203-32.	Long oil tube with cap.
3203-33.	Front contact post.
3203-35.	Bearing trunnion.
3203-36.	Motor (specify voltage).
3203-37.	Contact finger.
3204-7.	Gear frame.
3204-8.	Slot coil (250 ohms unless otherwise specified).
3204-9.	Magnet core.
3205-1.	Insulating top plate.
3207.	Brass brackets.
3208.	Coil bracket.
3209.	Armature bracket.
3210.	Slot armature.
3211.	Slot arm.
3212.	Lifting finger.
3213.	Time hook.
3515.	Insulating support.

Digitized by Google

Time Relay No. 3227



The No. 3227 Time Relay is designed to make contact when energy is applied and maintain contact for a predetermined time up to 20 seconds after energy is cut off from the relay. This is accomplished by a small motor, train of gears and lifting chain, which raises the slot coil to a certain height which cuts out the motor, but leaves the slot coil energized. When energy is cut off from the slot coil it returns to its normal position by gravity, maintaining contact on the way down. The time during which contact is maintained after the relay is de-energized may be adjusted for from 3 seconds to 20 seconds.

This arrangement is very useful in connection with certain types of train control.

Adjustment may also be made to provide for making contact after the slot coil is de-energized and maintaining contact for from 3 seconds to 20 seconds as required.

We invite inquiries as to the adaptability of this relay to various circuits.

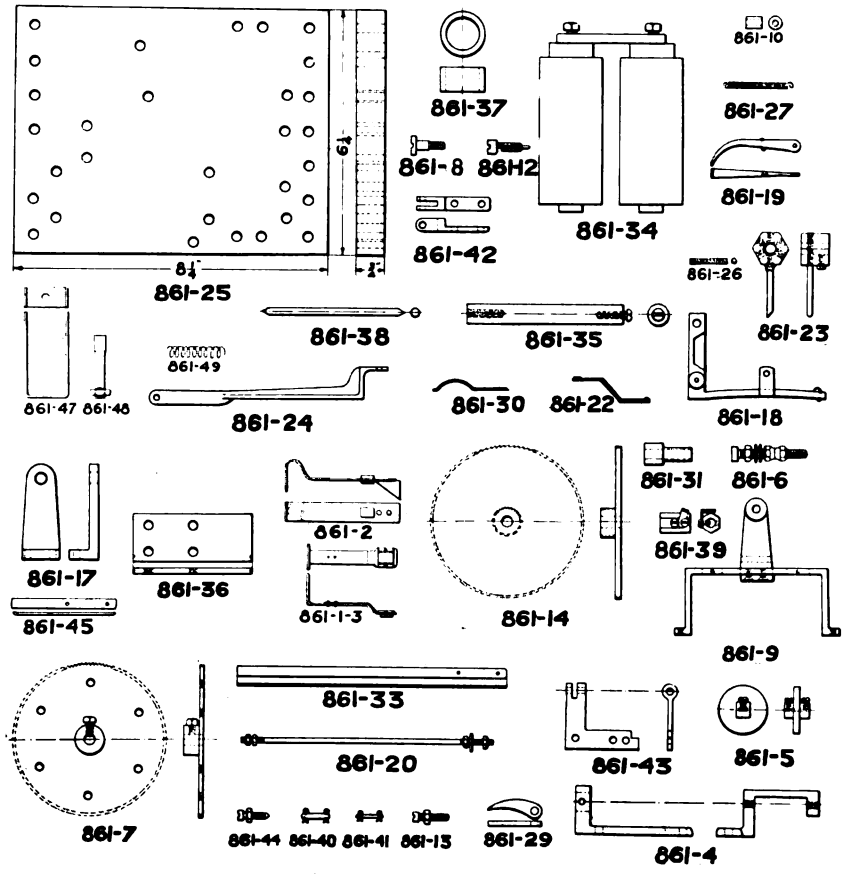
See also Time Relay No. 3200 on page 106.

Digitized by Google

Style 861 Time Circuit Breaker

(Manufacture Discontinued)

REPAIR PARTS



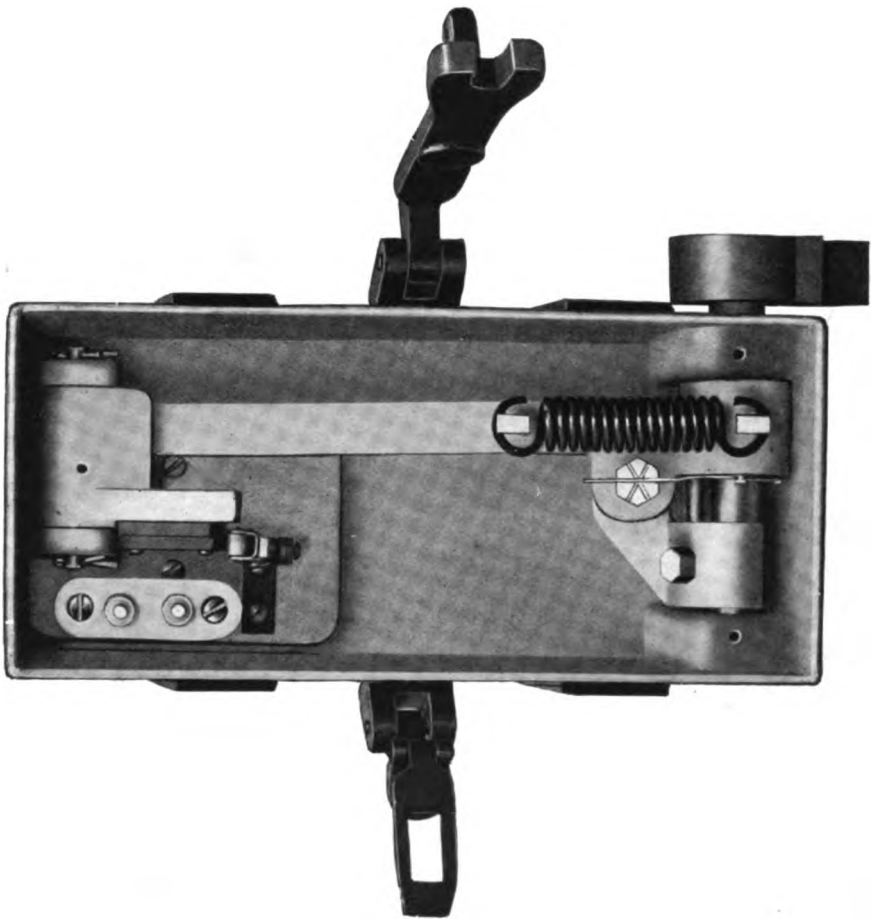
No.	Description
861-1.	Front contact spring.
861-2.	Common contact spring.
861-3.	Back contact spring.
861-4.	Bracket for 861-18.
861-5.	Counterweight, complete with screws.
861-6.	Binding post, complete with nuts and washers.
861-7.	Main spur gear with set screw.
861-8.	Bearing screw for 861-14.
861-9.	Magnet support, complete as shown.
861-10.	Bone bushing, two required.
861-12.	Armature trunnion screw, two required.
861-13.	Bearing screw for 861-38, two required.
861-14.	Ratchet gear and pinion.
861-17.	Bearing bracket, two required.
861-18.	Rocker arm.
861-19.	Large operating pawl.
861-20.	Magnet connector, two required.
861-21.	Armature contact arm and spring.
861-22.	Back contact spring.
861-23.	Hub with operating arm (specify number of points).
861-24.	Up and down rod.

No.	Description
861-25.	Drilled and enameled slate base.
861-26.	Bone screw, two required.
861-27.	Spring for 861-19.
861-29.	Hold pawl.
861-30.	Spring for 861-29.
861-31.	Base leg, four required.
861-33.	Counterweight spring.
861-34.	Magnet, complete.
861-35.	Magnet yoke support.
861-36.	Armature.
861-37.	Rubber magnet washer.
861-38.	Axle for 861-23.
861-39.	Armature stop, complete as shown.
861-40.	Pivot pin for 861-24.
861-41.	Pivot pin for 861-19 and 861-29, two required.
861-42.	Connection for 861-24.
861-43.	Bracket for 861-29.
861-44.	Pivot pin for 861-18.
861-45.	Re-enforcing spring for 861-33.
861-47.	Brake bracket with screws.
861-48.	Brake plunger.
861-49.	Brake spring.

Digitized by Google

Rail Contacts

TYPE "K"



The type "K" Rail Contact is equipped with either one normal open or one normal closed contact.

The circuit is closed or opened by each pair of wheels in a train.

This type of rail contact is adaptable to various requirements, especially for train annunciators and crossing signal cut out circuits in connection with installations similar to the one depicted on page 114.

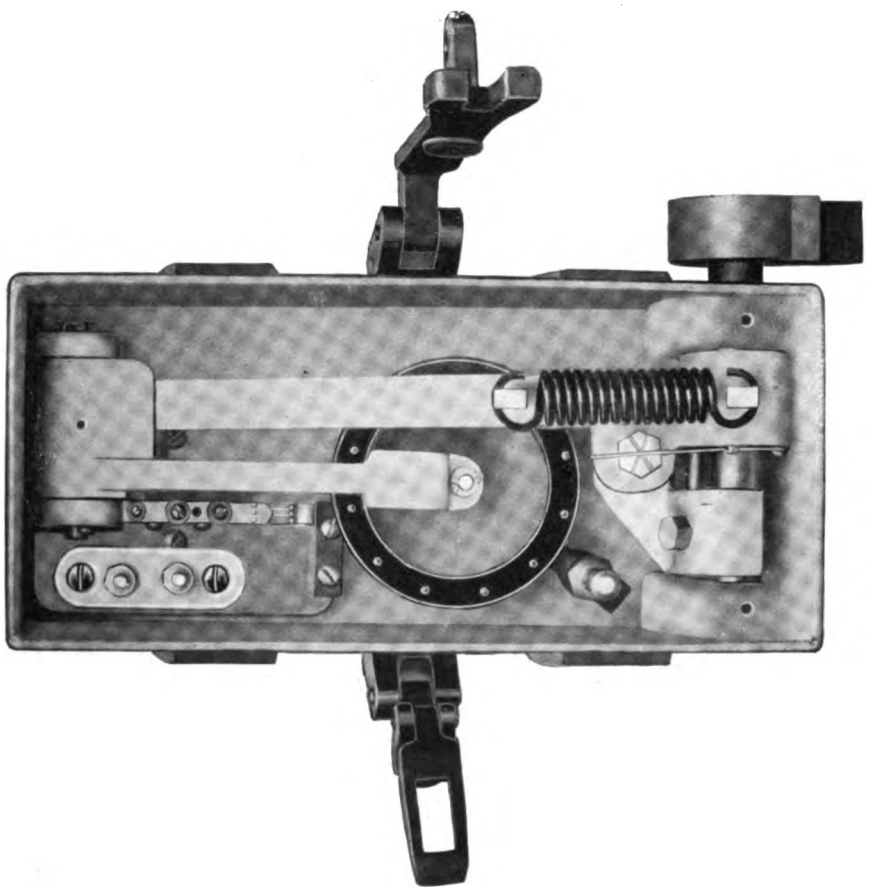
No. 600. Rail contact, type "K," quick acting—normal open.

No. 601. Rail contact, type "K," quick acting—normal closed.

Digitized by Google

Rail Contacts

TYPE "S"



The Type "S" Rail Contact is equipped with either one normal open or one normal closed contact and is so designed that the contact will be operated by the first pair of wheels in a train and will remain in this position until the entire train has passed and then restore itself to its normal position after a period of a few seconds. This length of time is determined by the adjustment of the diaphragm valve. The diaphragm prevents the operation of the contact between the trucks of a car.

No. 602. Rail contact, type "S," slow acting—normal open.

No. 603. Rail contact, type "S," slow acting—normal closed.

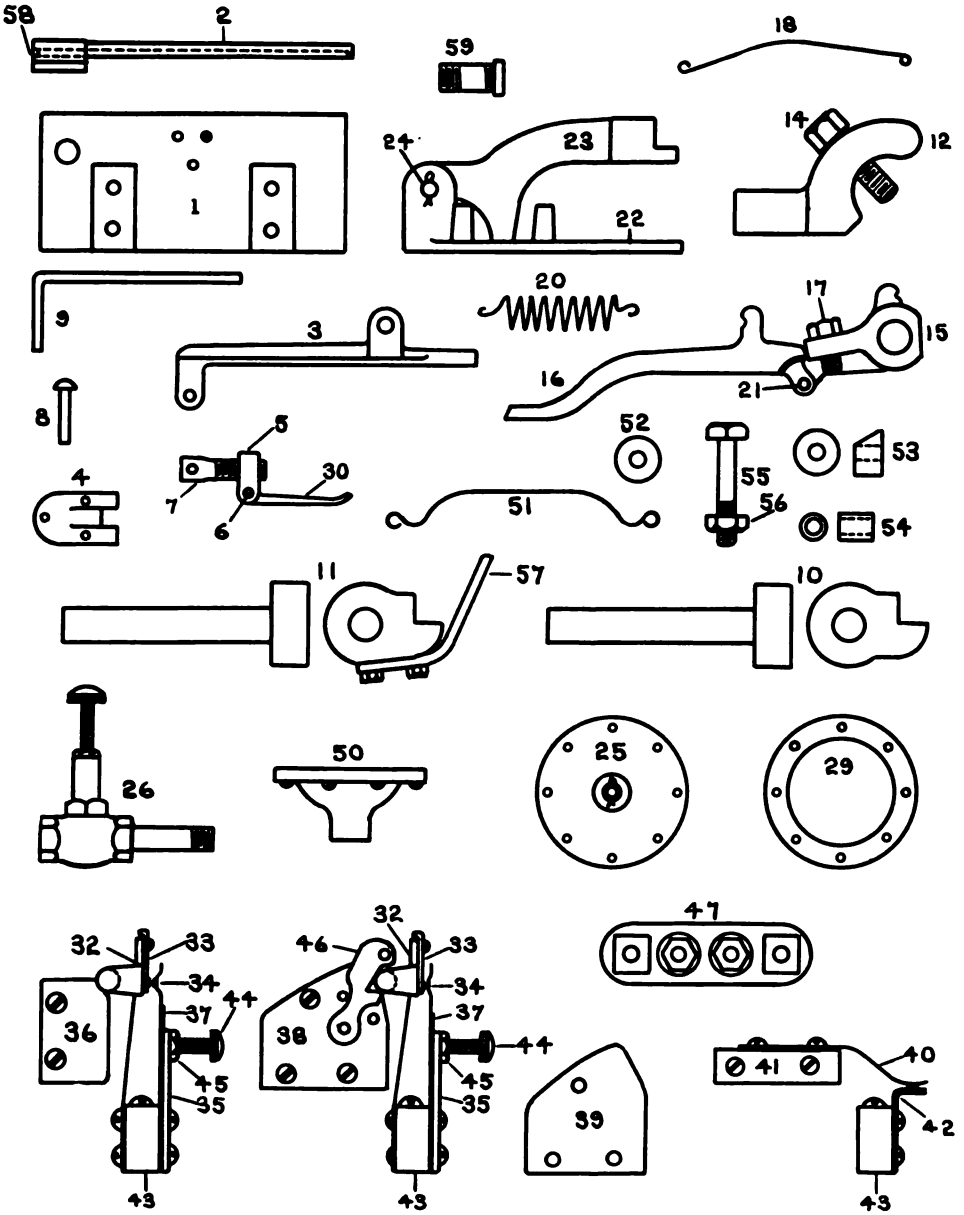
No. 610. Rail contact, type "S," slow acting—normal open, single impulse.

Digitized by Google

Rail Contacts

TYPE "S" TYPE "K"

REPAIR PARTS



Digitized by Google

Rail Contacts

TYPES "S" AND "K"

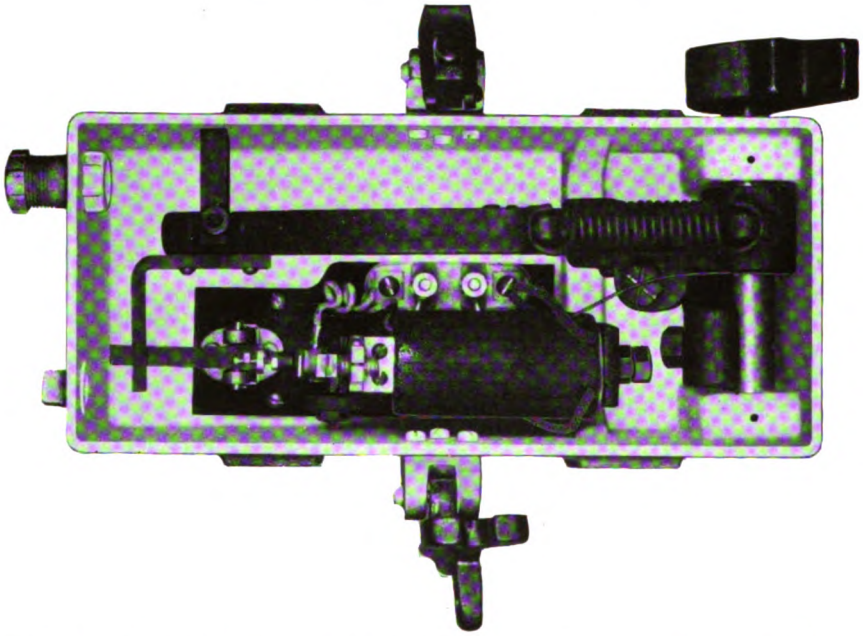
REPAIR PARTS

No.	Description
1.	Case.
2.	Case cover.
3.	Locking lever.
4.	Locking lug.
5.	Locking nut.
6.	Locking nut pin.
7.	Locking screw.
8.	Locking lug pin.
9.	Supporting tie strap.
10.	Operating foot and shaft (regular).
11.	Operating foot and shaft (spring type).
12.	Lifting chair.
14.	Cap screw holding lifting chair to shaft.
15.	Operating lever heel.
16.	Operating lever toe.
17.	Depression adjustment screw.
18.	Adjustment screw locking wire.
20.	Compensator spring.
21.	Operating lever pin.
22.	Movement base.
23.	Movement knuckle.
24.	Knuckle shaft.
25.	Diaphragm.
26.	Diaphragm check valve.
29.	Diaphragm ring.
30.	Locking hasp.
32.	Spring roller support.
33.	Roller contact.
34.	Vertical contact finger.
35.	Finger adjustment strip.
36.	Quick acting roller cam.
37.	Contact finger reinforcement.
38.	Single impulse roller cam.
39.	Roller cam insulation.
40.	Normal closed contact finger.
41.	Contact finger fibre support.
42.	Stationary contact.
43.	Fibre support for rollers and contacts.
44.	Contact adjustment screw.
45.	Locknut for contact adjustment screw.
46.	Single impulse trigger.
47.	Porcelain terminal block.
50.	Diaphragm case.
51.	Rail spring.
52.	Rail spring washer.
53.	Rail spring filler block.
54.	Rail spring bushing.
55.	Rail spring bolt.
56.	Rail spring nut.
57.	Rail spring operating arm.
58.	Shaft cover.
59.	Wire inlet nipple and bushing.

Digitized by Google

Rail Contact No. 2520

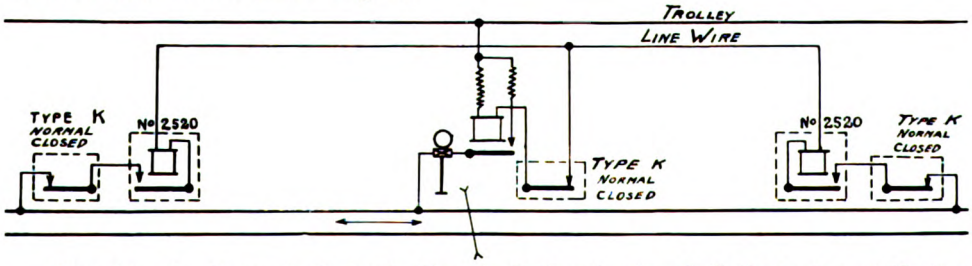
With Self Contained Stick Circuit



The No. 2520 High Voltage Rail Contact is very similar to our Type "K" contactor, described on page 110 but has a self contained stick circuit.

When depression of the rail mechanically closes the contact in the No. 2520 boxes, the coil holds the contact closed after the car or train has passed the contactor and it does not open until the train has passed a cut-out contact, usually a Type "K" Contact.

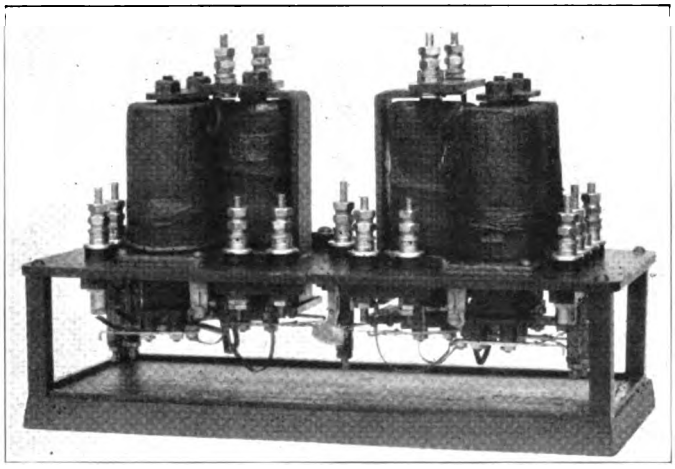
When used in connection with highway crossing signals on Electric Railways, the trolley current may be used for both control and operation, eliminating all battery energy and stick relays simplifying crossing signal installations to a marked degree.

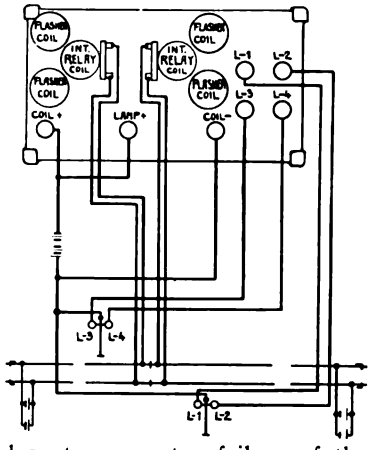


Showing circuit on single track Electric Railroad using Rail Contacts and Trolley Current for control and operation of crossing signal. Details on request.

Digitized by Google

Combined Flasher and Interlocking Relay No. 3045





The Combined Flasher and Interlocking Relay consists of a flasher unit of standard design and in addition an interlocking relay having back contacts only.

The Flasher Relay coils are wound to a resistance of 250 ohms each, or 500 ohms per pair, for operation on 8 volts direct current. The operating contacts are separate from the flashing contacts so that either A. C. or D. C. may be used to light the signal lamps.

The ingenious interlocking feature is so designed as to prevent a failure of the crossing signal due to simultaneous release of the two armatures. The coils will be wound to any specified resistance.

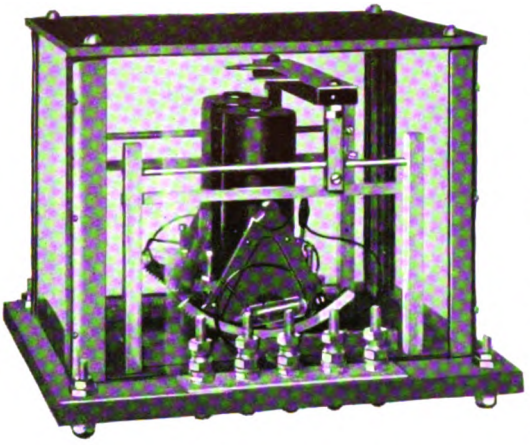
This one relay will perform the functions of the two relays formerly required and its separate parts have characteristics identical with the relays of standard design. All parts and the general construction meet A. R. A., Signal Section, specifications.

The combined instrument measures 7½ inches wide by 15½ inches long by 9½ inches high and may be installed where there would be room for only one of the standard relays. All inter-connections possible are made within the instrument, thus not only making economy possible due to smaller housings required, but also reducing to a minimum the wiring required.

Contact parts for this relay may be ordered from the list shown on page 91. The order should mention the fact that the parts for use on No. 3045 Relay.

Digitized by Google

Type "M.F." Flasher Unit



The "M.F." Flasher is designed primarily for alternately flashing the lights in Highway Crossing Signals. It embodies the suggestions of the Signal Section of the A. R. A. and may be used with practically all types of highway crossing light signals.

The operating mechanism is of a rocker design, very simple in construction, consisting of a pair of coils which oscillate in a magnetic field. There are no pivots or bearings to wear and cause trouble and the moving parts have been reduced to a minimum.

The contact arrangement utilizes mercury in cylindrical tubes filled with inert gas to prevent disintegration, oxidation, or other chemical action. These tubes have been thoroughly tested; have long life under severe working conditions, and have many advantages that make them ideal for this type of service.

The mercury, being a liquid, so adjusts itself to the surfaces of the electrodes as to establish maximum area of contact, giving highest conductance.

Due to the inert gas which fills the tubes, no oxidation or combustion can result from the arc which may be formed on the making or breaking of contact. On this account no deterioration results.

The heat of any arc so formed is quickly dissipated by volatilizing the small amount of mercury in immediate contact and the condensing of the mercury vapor on the walls of the glass tube. The heat, therefore, is dissipated over a large area of radiation. The result is that the contacts do not become pitted, burned or stuck together. The mercury which condenses on the tube wall does not plate on the tube but, due to the inert gas within the tube, the mercury returns to the globule of contacting mercury.

There is no loss of contact metal due to wear, vaporization, or chemical action.

On alternating current any electric arc which may be formed is immediately broken because of the valve effect of the mercury arc.

Direct current service requires merely a sufficient separation of the mercury from the electrodes to break the arc completely without deterioration of contacts if within the rated capacity of the tubes. If for any reason it does become necessary to change these tubes, such change is more easily accomplished than with the ordinary finger arrangement of contacts.

The Flasher is ordinarily adjusted for approximately thirty-eight flashes per minute, which is the speed usually required. The instrument may be adjusted to operate from thirty to forty-five flashes per minute.

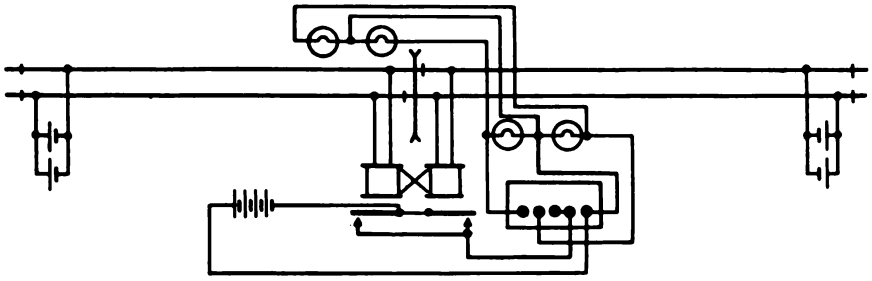
See page 119 for repair parts.

Digitized by Google

Type "M.F." Flasher Unit

(Continued)

The standard flasher is arranged to alternately flash the standard Flashing Light Crossing Signal lamps recommended by the A. R. A., Signal Section, as shown in the typical track circuit diagram below.

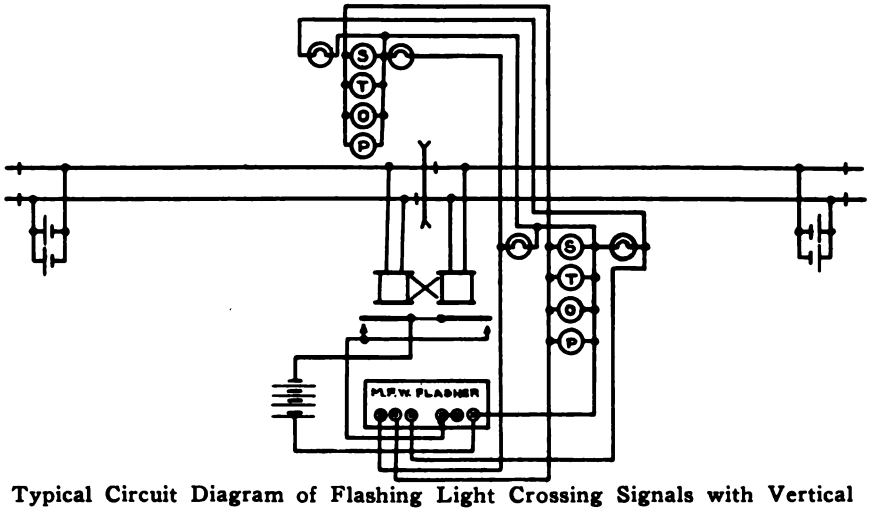


Typical Circuit Diagram of Standard Flashing Light Crossing Signal with the Standard Type "M.F." Flasher

At some crossings it is found advisable to add "STOP," "DANGER" or similar signs to the standard Flashing Light Crossing signals. A special type "M.F.W." Flasher can be furnished for use in connection with such installations, which will flash the "STOP" or other sign between flashes of the individual lamps of the standard Flashing Light Crossing Signal.

The flasher is, in every way, like the standard "M.F." Flasher with the addition of a special mercury contact tube to flash the additional sign.

A circuit diagram showing the use of this special flasher, in connection with standard flashing light crossing signals and our Vertical Stop Unts, is shown below as applied at the intersection of a highway and a single track railroad.



Typical Circuit Diagram of Flashing Light Crossing Signals with Vertical Stop Units and the Special Type "M.F.W." Flasher

These flashers can be furnished for operation on 6-volt, 8-volt, 10-volt and 12-volt direct current circuits or 110 volts, 60 cycles. A marked advantage of the design, particularly on low voltage D. C. circuits, is the allowable voltage variation which is from 15 to 20%, without material change in the number of flashes per minute.

Special contact arrangements can be furnished.

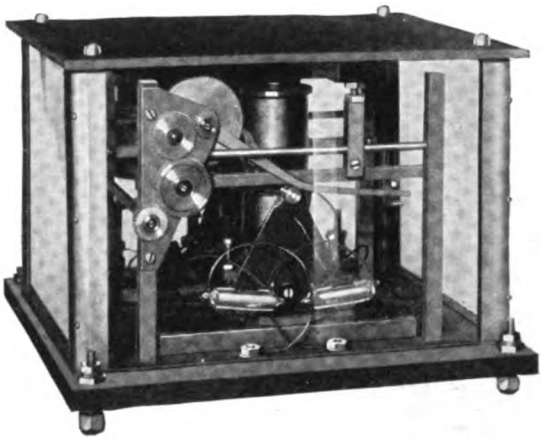
Description

No. 3600. Standard Type "M.F." Flasher, complete. (Specify voltage.)
No. 3660. Special Type "M.F.W." Flasher, complete. (Specify voltage.)

See page 119 for repair parts.

Digitized by Google

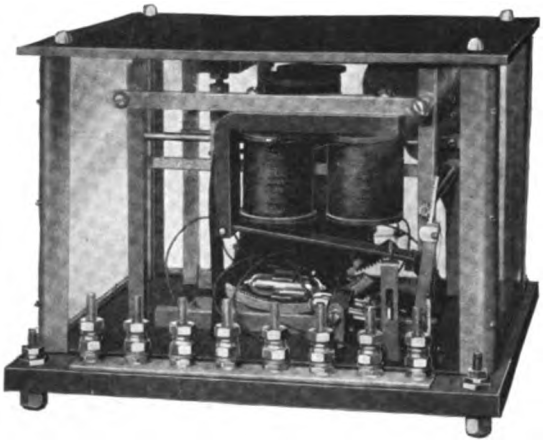
Combined Time Relay and Flasher Type "M.T.U."



Occasionally train movements are such at particular locations adjacent to yards, stations, etc., that ordinary methods of control of automatic Highway Crossing Light Signals keeps them operating for many hours per day when no trains are actually about to cross the highway.

For such locations the "M.T.U." Time Relay Flasher is specially adapted. It combines a Flasher Unit, essentially the same as an "M.F." Flasher Unit, with a timing element which may be adjusted for operation of the Crossing Signal for any period of time from 10 seconds to 6 minutes, as may be required, after a train has entered the control circuit.

The approach of a train may be made to start the Flasher and Time Element through a track relay or contact box and after the predetermined time interval has expired the signal ceases to operate, regardless of whether the train has actually passed the highway crossing or not.



This unit can be furnished for operation on any specified direct current voltage from 6 to 16 volts.

The time interval is adjusted in the factory to the specified time and can be changed in the field without opening the case.

As nearly all installations requiring time element control, are special in many ways, we request that you communicate with us with regard to the use of this instrument in connection with Highway Crossing Flashing Light Signals requiring time limit operation.

Our Engineering Department will be glad to co-operate in the design of control circuits and methods of every kind required to adequately and economically protect Highway Traffic.

Description

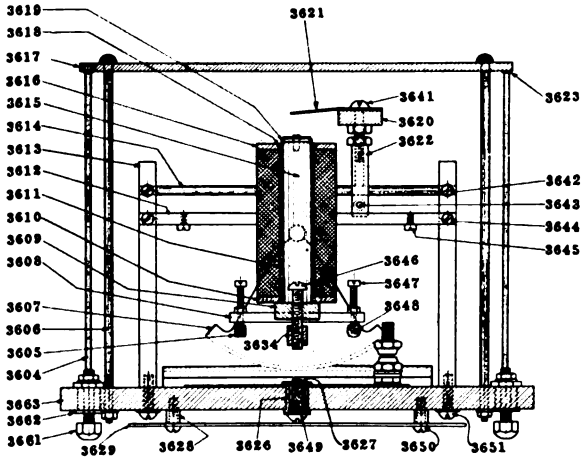
No. 3670. Type "M.T.U." Combined Time Relay and Flasher, specify voltage, time interval and number of flashes per minute.

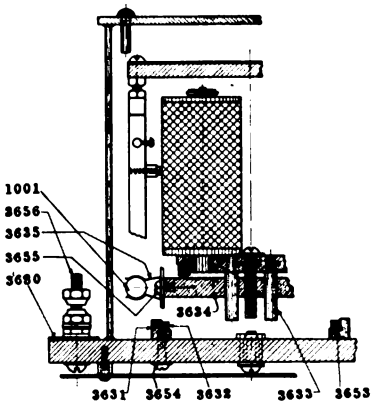
Note parts list on page 119.

Digitized by Google

Types "M.F." and "M.F.W." Flasher Units Type M.T.U. Time Relay and Flasher

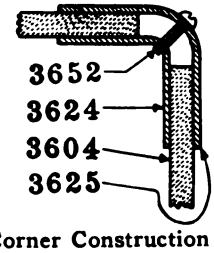
REPAIR PARTS





Typical Sections

No.	Description
1001.	Mercury tube (specify type of flasher).
3604.	Glass (specify side or end).
3605.	Stay bar.
3606.	Cover bolt.
3607.	Gear segment.
3608.	Adjustment bar.
3609.	Magnet core base.
3610.	Bottom coil washer (3664 Top coil washer).
3611.	Fibre coil tube.
3612.	Retaining bar.
3613.	Corner post.
3614.	Brace rod.
3615.	Magnet core.
3616.	Magnet coil (specify operating voltage of flasher).
3617.	Cover plate.
3618.	Lock ring.
3619.	Lock ring.
3620.	Armature.
3621.	Armature plate.
3622.	Armature support.
3623.	Felt gasket.
3624.	Inner corner support.
3625.	Outer corner support.
3626.	Shipping bushing and nut.
3627.	Shipping screw nut.
3628.	Spacing sleeve.
3629.	Fibre shield.
3630.	Terminal plate.
3631.	Gear rack holder.
3632.	Gear rack.



Corner Construction

No.	Description
3633.	Guide rod.
3634.	Guide rod bar.
3635.	Tube clamp.
3641.	Round head machine screw.
3642.	Round head machine screw.
3643.	Round head machine screw.
3644.	Round head machine screw.
3645.	Fillister head machine screw.
3646.	Round head machine screw.
3647.	Fillister head machine screw.
3648.	Round head machine screw.
3649.	Shipping screw.
3650.	Round head machine screw.
3651.	Round head machine screw.
3652.	Round head machine screw.
3653.	Fillister head machine screw.
3654.	Round head machine screw.
3655.	Round head machine screw.
3656.	Connection terminal, complete with nuts.
3661.	Leveling adjustment screw.
3662.	Leveling bushing and nut.
3663.	Slate base.

Digitized by Google

Magnetic Flasher

No. 3400A

The Magnetic Flasher is designed and operates on the proven principles of the Model 5 Magnetic Autoflag.

Contacts are arranged so that should the Flasher fail to start, because of operating battery failure or other cause, all lights will burn, provided a source of energy is available for their operation.

The standard flashing contacts have carrying capacities of 10 amperes each and special contacts with a capacity of 15 amperes can be furnished on request. No arcing will occur at the contacts due to provision for absorption.

Due to the fact that the Flasher operates on the principle of an unbalanced wheel, the number of flashes per minute is not affected by variations of operating voltage up to 20 per cent above or 25 per cent below normal.

Adjustments in the factory provide for 38 flashes per minute, unless otherwise specified. Adjustment for 30 to 45 flashes per minute can be made in the field as easily as in the factory or shop.

The adjustment is simply a matter of lowering the adjustment weight to increase the number of flashes or raising the weight to decrease the number of flashes per minute.

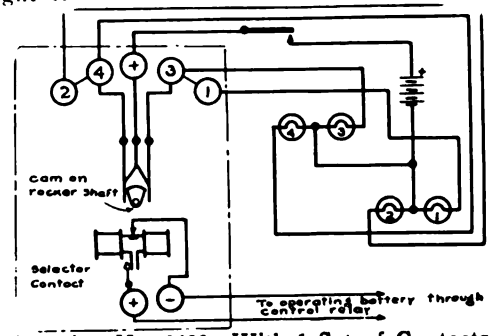
The standard flasher is equipped with one set of flashing contacts to be used for flashing the lights at a crossing in the usual manner.

The flasher can be furnished, when specified, with two sets of flashing contacts so that each individual lamp at a crossing is flashed through a separate contact. This flasher, with the two sets of flashing contacts, can also be used with two separate batteries; one for each pair of lights, and if desired, a third battery for operation of the flasher itself. This method of supplying energy is standard practice on some railroads and is always desirable where several sets of flashing lights are operated from the same control circuit and through the same flasher.

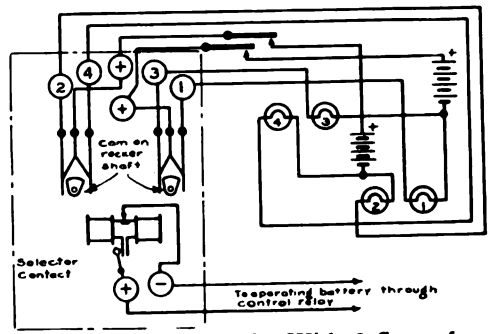
The flasher can be furnished for operation on any specified direct current from 6 volts to 16 volts.

No. 3400. Standard Magnetic Flasher with one set of contacts. (Specify operating voltage and number of flashes per minute.)

No. 3400A. Magnetic Flasher with two sets of flashing contacts. (Specify operating voltage and number of flashes per minute.)



Showing No. 3400—With 1 Set of Contacts

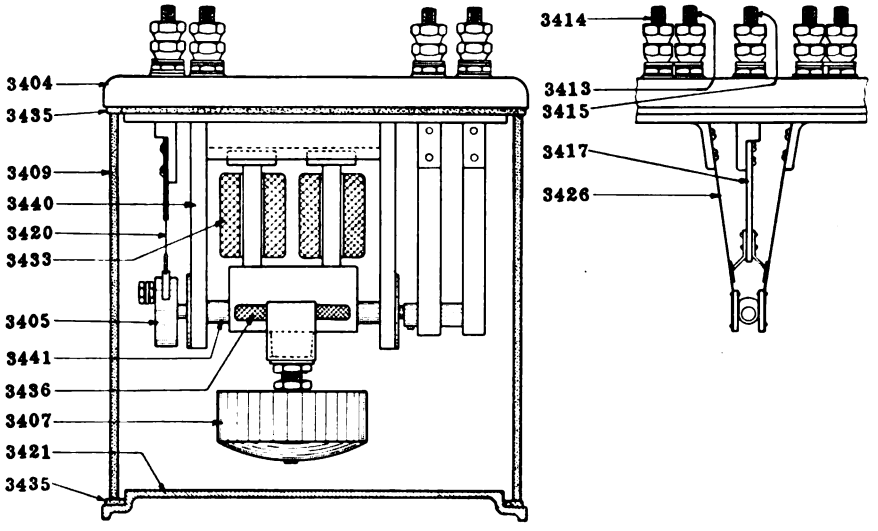


Showing No. 3400A—With 2 Sets of Contacts and Separate Batteries

Digitized by Google

No. 3400 Magnetic Flasher

REPAIR PARTS

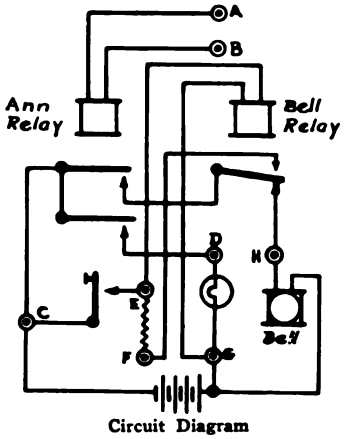


No.	Description
3404.	Porcelain top.
3405.	Operating contact, complete.
3407.	Adjustment weight.
3409.	Cylindrical glass.
3413.	Front contact post.
3414.	Back contact post.
3415.	Center contact post.
3417.	Center flashing contact.
3420.	Operating contact finger, complete.
3421.	Base.
3426.	Flasher contact spring.
3433.	Coil (specify operating voltage of flasher).
3435.	Cork gasket.
3436.	Absorption resistance.
3440.	Shaft support, complete with ball bearings.
3441.	Rocker mechanism, complete.

Digitized by Google

No. 2110 Annunciator

(With Cover Removed)



Circuit Diagram

For use in interlocking towers, gateman's houses, stations, etc., the No. 2110 Annunciator is ideal, due to the flexibility in arrangement of its various parts and the many circuit combinations in which it can be used.

The entrance of a train into the annunciator circuit causes a bell to ring and the lamp to light up behind the glass covered aperture. By pressing the push button the bell control relay is picked up, causing the bell to stop ringing, but the lamp continues to burn as long as the annunciator circuit is occupied. The resistance which is cut in after the bell control relay is picked up is not furnished unless specified and will then be governed by the voltage of the local battery.

One bell can be used for several of these annunciators and therefore the bell is not made a part of the annunciator, but must be ordered separately.

The annunciator is so constructed and binding posts are provided so that it can be furnished complete with push button and lamps in the housing, less push button but with the lamp, less lamp but with push button or less both lamp and push button. In these cases binding posts are provided so that the button or lamp or both can be located at a convenient point removed from the annunciator itself.

The lamp socket is adjustable to use any single contact bayonet base lamp from a G-6 bulb to an S-11 bulb.

The annunciators are 3⅜ inches wide by 10¼ inches high by 4¼ inches deep and they can be banked side by side very conveniently.

The line circuit relay will be furnished as specified up to 1000 ohms resistance.

The voltage of the lamp and resistance of the bell will be governed by the local battery used and should be specified on the order.

Description

No. 2110. Annunciator complete with push button and lamp.

No. 2110-A. Annunciator complete with lamp for use with detached push button.

No. 2110-B. Annunciator complete with push button for use with detached lamp.

No. 2110-C. Annunciator complete for use with detached push button and lamp.

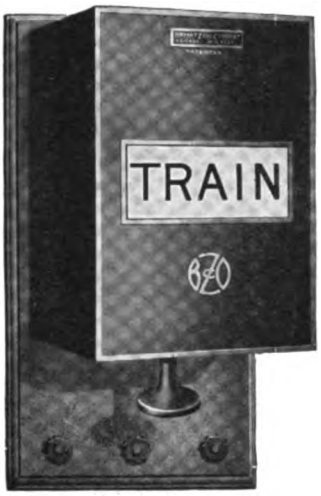
For bell for use with above annunciators, see pages 76 to 85, inclusive. (Specify resistance.)

For detached push button for use with above, see page 127.

Note:—Specify resistance to be cut in series with bell control relay if desired, otherwise a jumper will be necessary between posts "E" and "F."

Digitized by Google

Type B Annunciator



No. 305
Mechanical Reset

Showing Annunciator with Cover Removed
No. 306
Electrical Reset

A small compact instrument of the Unit type with iron cover, 4x4x11 inches over all, permits placing between tower windows.

Simple in design—reliable in operation.

So constructed as to eliminate all possibility of shutter being released by vibration.

Approaching trains release the shutter, displaying the card and closing local contacts for the operation of bells or buzzers. The cards can be easily changed.

The annunciator is designed for use at locations where it is desired to stop the bell ringing while the train is still in the tripping section. To stop bell ringing while tripping section is occupied, it is only necessary to reset the shutter, which will then remain in the upper position until train leaves tripping section, at which time it will automatically reset itself and be ready for the next approaching train. For open circuit work only.

Unless otherwise specified the coils will be wound to 25 ohms resistance.

These annunciators can be reset manually or electrically by means of a push button located at any convenient place.

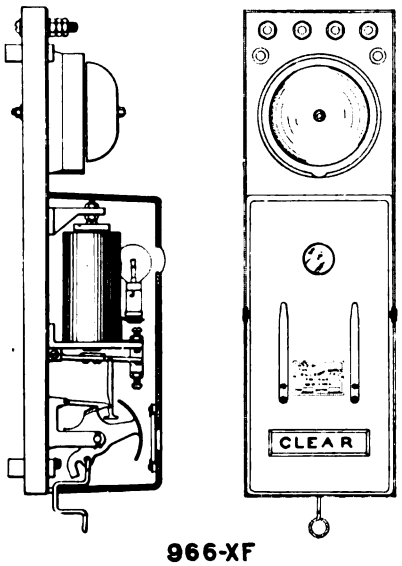
Circuit Plans Sent with Each Annunciator

Description

No. 305. Type "B" annunciator with mechanical reset.
No. 306. Type "B" annunciator with electrical reset.

Digitized by Google

The Improved Everett Annunciator



966-XF

This is an improvement over the original rugged, well-designed instrument. In addition to the latching arrangement which permits the restoring of the indicator drop while a train is on the circuit, thereby avoiding the unnecessary ringing of the bell, an indicator light has been added.

When the Indicator drop is released a light illuminates the "bull's-eye" and the bell starts to ring. Pulling down the restoring hook stops the bell and restores the drop, but the indication light remains in circuit until the train clears the section, restoring the coil circuit and opening the light contact.

Regularly this type is made only for closed circuit. Can be furnished to operate direct from track and also for any desired resistance up to 1000 ohms. All working parts are enclosed under an iron cover fitted closely on heavy slate base.

The instrument is 14½x4½x4½ inches and is furnished in single units which can be banked side by side. When used in groups, only one bell is required, as light and drop give necessary visual indication.

Description

No. 966-X-F. Everett Annunciator with indication light for closed circuit. (Specify Resistance.)

No. 966-X. Everett Annunciator without indication light, for open circuit. (Specify Resistance.)

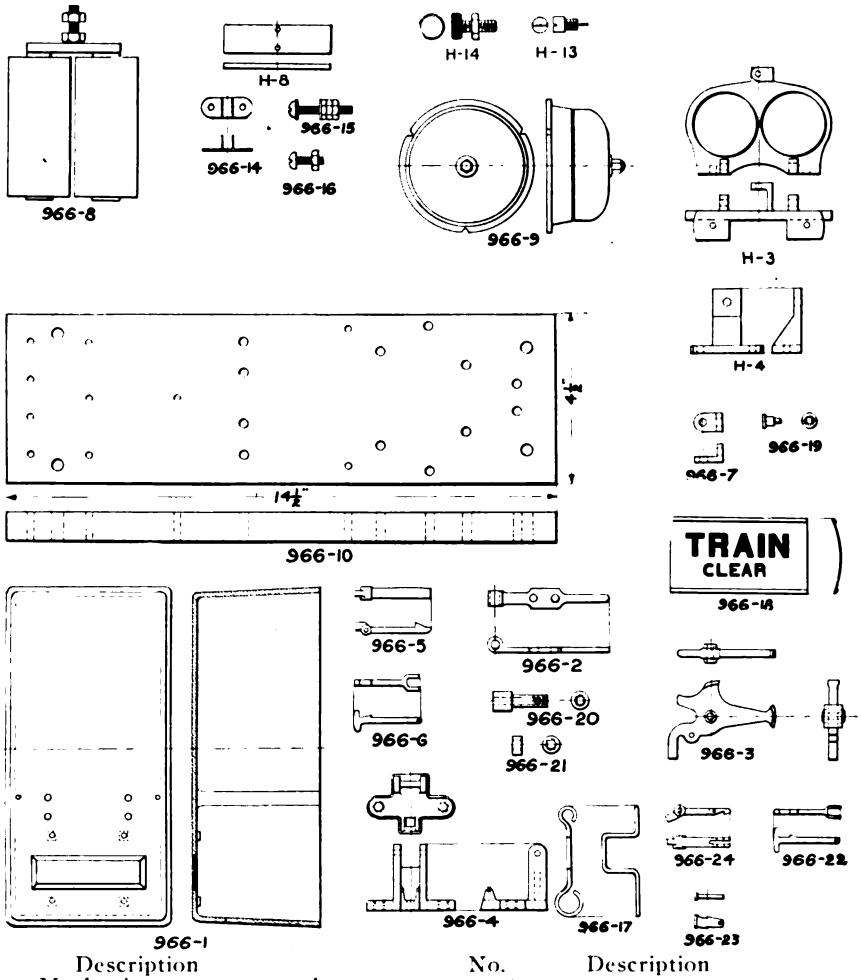
No. 966-C. Everett Annunciator for closed circuit, without indication light. (Specify Resistance.)

No. 966-X-M. Everett Annunciator for open circuit with magnetic restoring attachment. (Specify Resistance.)

Digitized by Google

The Improved Everett Annunciator

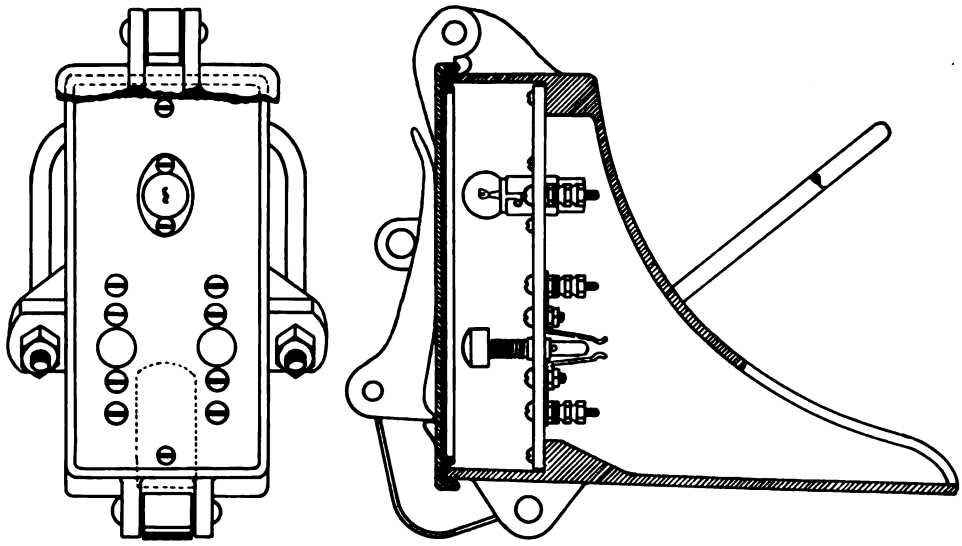
REPAIR PARTS



No.	Description
966-1.	Mechanism cover, complete.
966-2.	Armature carriage.
966-3.	Latch.
966-4.	Latch carrier.
966-5.	Hold pawl.
966-6.	Release pawl.
966-7.	Hook bracket.
966-8.	Magnet, complete. (Specify resistance.)
966-9.	Enclosed weatherproof bell. (Specify resistance.)
966-10.	Slate base, drilled and enameled.
966-14.	Bell ringing contact.
966-15.	Binding post, complete as shown.
966-16.	Screw and nut for 966-14.
966-17.	Hook for manual restoration.
966-18.	Train card and holder.
966-19.	Shoulder pin.
966-20.	Base leg.
966-21.	Base leg nut.
966-22.	Release pawl hook (for closed circuit).
966-23.	Release pawl (for closed circuit).
966-24.	Hold pawl (for closed circuit).
H-3.	Magnet frame with screws.
H-8.	Armature.
H-4.	Magnet support with screws.
H-13.	Armature trunnion screw.
H-14.	Adjusting screw with nut.

Digitized by Google

Autoflag Test Box No. 165



There are numerous installations of Highway Crossing Protection Devices in outlying, non-automatic territory, where inspection by signal forces is necessarily infrequent. Because track forces are more often in the vicinity of such locations, it is very desirable that apparatus be installed which will allow the track maintenance forces to shunt the track relays and ascertain whether the protecting devices are in operative condition. When possible, this device should be entirely separate from the relays and other control apparatus.

We have designed the No. 165 Autoflag Test Box, illustrated above, for this purpose. This can be attached to the No. 161 Gooseneck Bracket furnished with our Autoflags and Highway Crossing Signals, when relay boxes are used.

The Test box is of cast iron, with hinged cover, hasp and staple, and "U" bolt for fastening. Within is an insulating panel on which are mounted back connected, normally open circuit push buttons, to which the track wires may be connected. When the push buttons are pressed the track relays will be shunted and the operation of the Crossing Alarm may be observed under the conditions which would exist were a train approaching or passing the crossing.

When a charging device and storage battery are used to supply the current for the Autoflag or other protecting device, a small lamp can also be provided on the panel to indicate whether the charging device is operating. This lamp may burn at all times when the charging device is operating or it may be so arranged, in connection with a push button, that it will be cut into the circuit only when the push button is pressed.

This device can be applied to existing installations, where our No. 161 Gooseneck Brackets were used, by removing the hand hole cover, substituting the No. 165 Test Box, and making the necessary connections to the track wires. It can also be furnished with any of our Autoflags or Highway Crossing Signals, when a relay box and bracket are also furnished.

Description

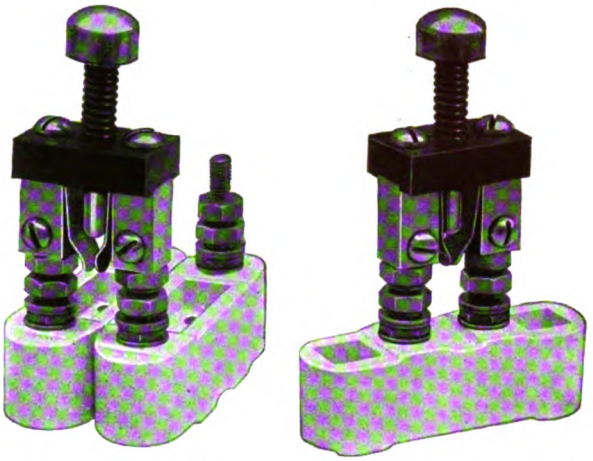
No. 165-A. Autoflag test box, with 1 push button.
No. 165-B. Autoflag test box, with 1 push button and 1 indicating lamp.
No. 165-C. Autoflag test box, with 2 push buttons.
No. 165-D. Autoflag test box, with 2 push buttons and 1 indicating lamp.
No. 165-E. Autoflag test box, with 3 push buttons.
No. 165-F. Autoflag test box, with 3 push buttons and 1 indicating lamp.

Normally, open circuit push buttons are furnished unless otherwise specified.

For installations where no gooseneck bracket is used, we call your attention to the Type "O" push button illustrated and described on the opposite page.

Digitized by Google

Type "O" Short Circuiting Push Button



The Type "O" Short Circuiting Push Button illustrated above was designed for testing crossing alarm circuits and other similar work where a normally open contact is required. The button provides a long rubbing contact having sufficient pressure to instantly shunt a track relay.

These buttons are so designed that they may be mounted on one or two A. R. A. Terminals as shown in the illustration and can, in a number of cases, be applied to existing installations, where the Autoflag Test Box illustrated and described on the opposite page could not be used.

Description

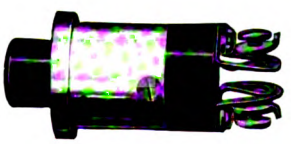
No. 45. Type "O" short circuiting push button only.

No. 46. Type "O" short circuiting push button, complete with 1 terminal block.

No. 47. Type "O" short circuiting push button, complete with 2 terminal blocks.

Push buttons with normally closed contact can be furnished if required.

No. 85 High Voltage Push Button



No. 85

High Voltage for installation where 110 volt D. C. or A. C. is used.

Capacity, 1½ amperes. Shell turned from brass rod.

Phosphor bronze contacts and springs. Long, quick break. Condensite center.

	Size Hole Required	Description
No. 85.	¾ inch	Up to 110 volts, open circuit.
No. 85-C.	1⅛ inches	Up to 110 volts, closed circuit.
No. 85-A.	1⅛ inches	Up to 220 volts, open circuit.

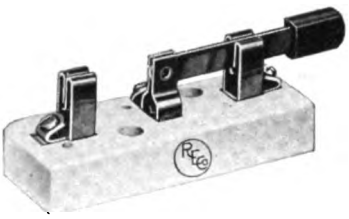
Digitized by Google

Battery and Telephone Switches

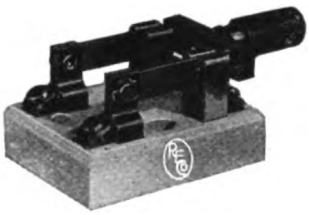
PORCELAIN BASE

Construction Meets All Requirements of Railroad Signal and Electrical Engineers

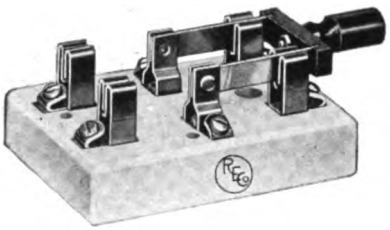
No. 707. S. P. S. T.



No. 708. S. P. D. T.



No. 709. D. P. S. T.



No. 710. D. P. D. T.

25 Amperes

These switches are all fitted with the return bend self adjusting type of clip which prevents the blade from catching on the edge of the clip and at the same time provides a spring pressure between the blades and the clip.

The CLIPS ARE ALL LOCKED in place to PREVENT TURNING, so that **loose connection cannot develop.**

All switches are 25 ampere capacity and are designed for use in connection with crossing alarms, locking circuits, battery circuits and telephone work.

Wherever a small reliable switch is required in connection with signal work, the use of these switches results in satisfaction.

Description

No. 707.	Single Pole Single Throw Switch	3¾"x1⅛"
No. 708.	Single Pole Double Throw Switch	4¾"x1⅜"
No. 709.	Double Pole Single Throw Swith	3¾"x2"
No. 710.	Double Pole Double Throw Switch	5" x2⅝"

Digitized by Google

Battery and Telephone Switches

COMPOSITION BASE

No. 1. S. P. S. T.

No. 2. S. P. D. T.

No. 5. S. P. D. T. Rapid Throw

No. 165-F Pole Changer Switch

These switches are of the flat type and are especially designed for use in places where space is restricted. Well adapted for controlling the sparking circuit on motor cars, etc.

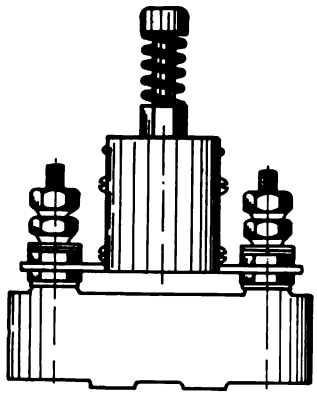
All contact parts are made of copper and the screws are of brass. The handle is heavily insulated. Has Rapid Throw from one contact to other on Double-Throw switches. Made to stand hard usage. Constructed so that the blade could not fall out of hinge even if the screws were removed.

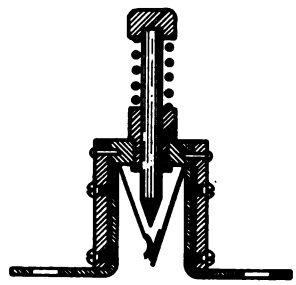
These switches can be fastened onto a metal support without danger of a short circuit.

No.	Description
1.	S. P. S. T. knife switch.
2.	S. P. D. T. knife switch.
5.	S. P. D. T. rapid throw knife switch.

No.	Description
165-B.	Back connection pole changer switch.
165-F.	Front connection pole charger switch.

Testing Jack No. 39





The No. 39 Testing Jack has a normally closed circuit and is designed to be placed on an A. R. A. porcelain terminal as illustrated.

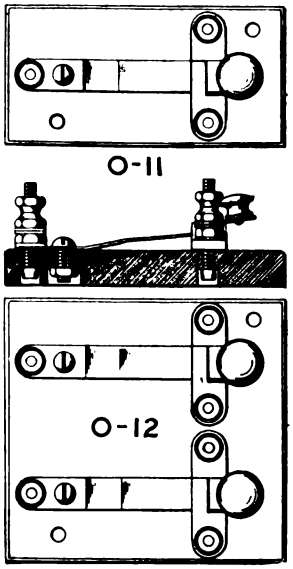
It is particularly adapted to installation in the charging circuit of Rectifiers to facilitate reading of the charging rate and will be found useful in many other ways.

By connecting the ammeter leads to the A. R. A. binding posts before pressing the plunger, which compels current to flow through the meter, the current flow can be measured without opening the circuit.

No. 39. Testing Jack for A. R. A. Terminal.
No. 39-C. Testing Jack complete with Terminal.

Digitized by Google

Strap Keys

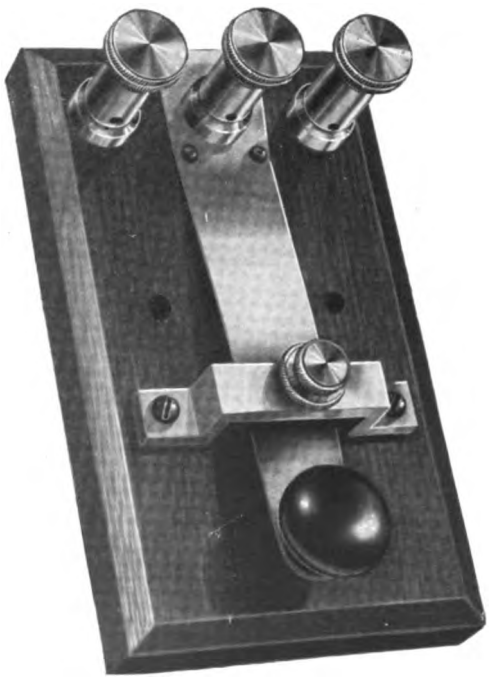


No. O-11 AND No. O-12
Porcelain Base

The O-11 Strap Key is mounted on a heavy porcelain base. Contacts are heavy and positive. The contact spring is made of heavy phosphor-bronze and gives strong pressure against contact. Binding Posts are R. S. A. Shipped with wood screws for mounting.

The O-12 is similar in general construction to the O-11, excepting has two keys mounted on one base of slate.

No. O-11. Strap key, complete.
No. O-12. Double strap key, complete.



No. 40

HARDWOOD BASE

This strap key is substantially made with hard wood base, three heavy brass binding posts and upper and lower platinum contacts.

It is so arranged that it can be used for normal open or normal closed circuit, or both.

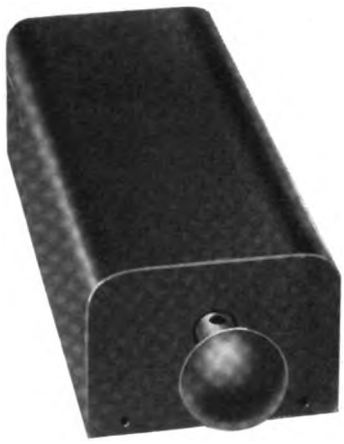
Shipped with wood screws for mounting.

No. 40. Strap key, 3⅜"x5¾" base.

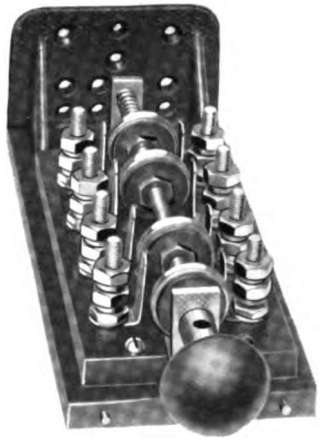
Digitized by Google

Emergency Release Switch

No. 3055—4 CIRCUIT
No. 3070—6 CIRCUIT
No. 3075—8 CIRCUIT



No. 3055



With Cover Removed

The emergency release switch may be used at automatic interlocked crossings, for manual control of Highway Crossing Signals, also in many circuits in interlocking plants and for numerous other purposes which will suggest themselves.

The switch is made in three sizes; four circuit, six circuit and eight circuit. Contacts will be arranged for any combination of normal open and normal closed circuits specified. Contact adjustments are accomplished by moving the discs along the threaded shaft to the desired point and locking them in position. Adjustments can be easily made while the switch is in service.

Contacts are amply spaced for 110 volt circuits and have a carrying capacity of 15 amperes. The insulation throughout is Bakelite which is non-shrinking and does not deteriorate in service.

Provision is made for sealing the switch so that the circuits cannot be disturbed nor access be had to the contacts without first breaking the seal.

When specified, springs will be furnished to restore the switch to normal after an operation. These can be arranged to spring normal "out" or spring normal "in" as required.

Description

No. 3055. Four circuit Emergency Release Switch.
No. 3070. Six circuit Emergency Release Switch.
No. 3075. Eight circuit Emergency Release Switch.

Specify contact arrangement and if spring is desired, whether to spring normal "in" or spring normal "out."

Digitized by Google

Condensers

MANSBRIDGE TYPE

These "Mansbridge Type" condensers are guaranteed to retain their rated capacity if not damaged by excessive voltage.

Their special construction permits of insulation to resist any specified voltage and current commonly used in telephone, telegraph, signal and train control circuits.

The foil is deposited electrolytically on thin paper. The foil deposit is so very thin that punctures of the insulation will cause the foil to burn away, clearing the condenser and impairing the efficiency and capacity so slightly as to be negligible.

Standard Condensers

No.	Capacity	Size, Inches
1-A.	1. M. F.	½x2¾x4
3-A.	.5 M. F.	½x1¾x4
4-A.	2. M. F.	$1\frac{3}{16}$x$2\frac{5}{16}$x4½
5-A.	1. M. F.	$1\frac{3}{16}$x$2\frac{5}{16}$x4½
7-A.	.1 M. F.	½x1¼x1¼
8-A.	.25 M. F.	½x1¾x3½
9-A.	2. M. F.	½x2¾x4
10-A.	.05 M. F.	½x$1\frac{3}{16}$x2¼
11-A.	.3 M. F.	½x1¾x3½
12-A.	.2 M. F.	½x1¾x4
13-A.	.15 M. F.	½x$1\frac{3}{16}$x2¼
15-A.	3. M. F.	1 x2¾x4
16-A.	1.3 M. F.	½x2¾x4
17-A.	3.5 M. F.	1⅛x2¾x4
19-A.	.55 M. F.	¾x1¾x3½

Condensers of special dimensions or capacity made to order.

Digitized by Google

Fuse Clips and Fuse Blocks

No. 54-41

No. 54-15

For bank mounting of fuse blocks with A. R. A. porcelain terminals, lightning arresters, etc., fuses mounted on A. R. A. terminals by means of the fuse clips illustrated herewith are very convenient.

Several styles are available to meet most every condition and to fit all sizes of cartridge fuses up to the standard 30 ampere 250 volt type.

The various styles will be furnished with or without the A. R. A. terminal blocks as specified.

Fuses not included unless specified.

No. 54-15. Midget Fuse clip, complete with base.
No. 54-16. Midget Fuse clip only.
No. 54-17. Midget Fuse only (specify rating).
No. 54-21. Fuse block for A. R. A. Standard $\frac{9}{16}$"x2" fuse.
No. 54-26. $\frac{9}{16}$"x2" A. R. A. Cartridge Fuse (specify rating).
No. 54-31. Fuse block for $\frac{3}{8}$"x2" midget fuse.
No. 54-36. $\frac{3}{8}$"x2" Midget Fuse (specify rating).
No. 54-41. Standard 30 amp. 250 volt Fuse block for $\frac{1}{2}$"x1$\frac{3}{4}$" cartridge fuse.
No. 54-46. $\frac{1}{2}$"x1$\frac{3}{4}$" Cartridge Fuse (specify rating).

Blow-Rite Fuse Wire

Blow-Rite Fuse Wire is a copper alloy made especially for low amperage fuses. It has great tensile strength and can be soldered without fear of burning the wire. It is rated at its exact blowing point and does not corrode or crystallize as does ordinary fuse wire.

Put up on spools containing 300 feet. Made in 1, 2, 3, 4, 5, 6, 7 and 10 ampere blowing point.

Digitized by Google

Light Signal Counter No. 3000

FOR A. C. OR D. C.

As there are no moving parts in connection with Position Light and Color Light Signals, from which to actuate a counter, it has been difficult to make signal performance reports.

The No. 3000 Light Signal Counter has been designed to register each time a lamp is lighted.

Three methods of connection are suggested.

(a) When lamps are lighted with A. C. only, the counter should be wound for A. C. operation and connected in multiple with the lamp.

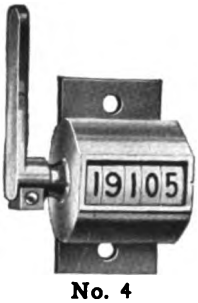
(b) When lamps are lighted from D. C. only, the counter should be wound for D. C. operation and connected in multiple with the lamp.

(c) When lamps are normally lighted with low voltage A. C., with D. C. as a reserve source of power, it is suggested that the counter be wound for D. C. operation from the reserve battery and controlled through a contact on the caution relay.

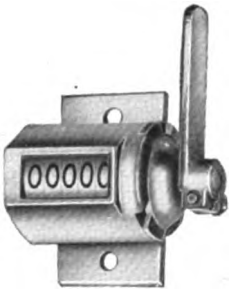
To insure lowest current consumption, the counter should be controlled by the caution indication, as the caution light is usually lighted for the shortest period of time.

When ordering, specify which method of connection is to be employed and the voltage and wattage of the lamp with which the counter is to be used.

Counters



No. 4



No. 14

No. 4. REVOLUTION COUNTER

The No. 4 Revolution Counter requires a complete revolution of the shaft for each registration. It is regularly furnished with a flange base, though the gib base can be had if preferred.

This counter has undoubtedly the most reliable form of driving mechanism of any of our various styles. Its action is most smooth and uniform. If run backward, the counter subtracts.

No. 14. RATCHET COUNTER

The No. 14 Ratchet Counter is similar to the No. 4, but supplied with outside stops which limit the throw of the lever. The counter has an improved driving mechanism and the driving pawls are made of hardened steel, and are forced against the ratchet on the first ring by coiled springs. This combination makes a most positive and durable form of drive.

An adjustable lever is supplied which allows the counter to be used at an angle. The flange base is supplied unless otherwise ordered.

This counter can be equipped with a return action spring which automatically returns the lever into position for the next count. It is only furnished with this return action spring when so ordered.

NEVER OIL

Digitized by Google

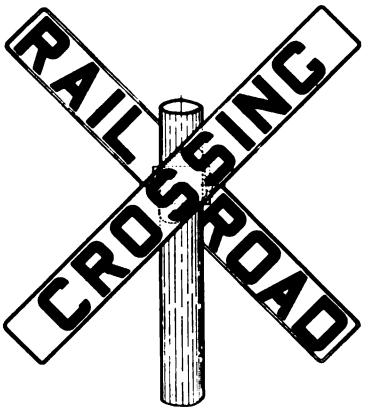
Section 4

Contents

NON-ILLUMINATED SIGNS
RELAY BOXES
BASES
PARKWAY CABLE FITTINGS
CABLE POSTS
BATTERY CHUTES
BATTERY BOXES
BATTERY VAULTS
CONCRETE HOUSINGS
PIPE CARRIER FOUNDATIONS
LOCKS
NUMBER PLATE HOLDER

Digitized by Google

Highway Crossing Signs



No. 3301. Two-piece Cast Iron

The No. 3301 cast iron Highway Crossing Sign is a two-piece sign designed in accordance with A. R. A. recommendations. It has reinforced edges and raised letters on both sides which are 5 inches high, 4 inches wide with 1 inch stroke. Furnished with black letters on white background unless otherwise specified.

Clamps are furnished for 3″ to 5″ pipe post usually drilled to mount the sign arms at a 90 degree angle as shown, but can be furnished for mounting the arms at a 70 degree angle if specified.

The sign arms are 6 inches wide by 4 feet long. When mounted at 90 degrees the spread of the sign is 38 inches and when mounted at 70 degrees the spread is 42 inches.

No. 3301. Highway Crossing Sign with clamps for 90 degree mounting (unless 70 degrees is mentioned on order. Specify painting.)

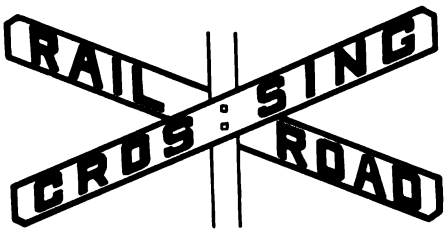
No. 3304. One-piece Cast Iron
No. 3306. Two-piece Enameled

The No. 3304 Highway Crossing Sign is a one-piece cast iron sign having letters one side only. Has raised border and letters, black on white background unless otherwise specified. Cross arm is 9 inches wide with 1 inch border. Letters are 5 inches high, 4 inches wide with 1 inch stroke. Furnished with clamps for 3″ to 5″ pipe post.

The No. 3306 Highway Crossing Sign is identical in size and appearance with the No. 3304, but is a two-piece enameled steel sign with clamps and bolts for mounting on 3″ to 5″ pipe post.

No. 3304. Cast iron Highway Crossing Sign with clamps.

No. 3306. Enameled Highway Crossing Sign with clamps.



No. 705. Two-piece Cast Iron
No. 2007. Two-piece Cast Iron

The No. 705 cast iron Highway Crossing Sign is of conventional design of two pieces which are reversible and lettered on both sides. It has reinforced edges and raised letters which facilitate repainting. Black letters on white background furnished unless otherwise specified. Letters are 5 inches high, 4 inches wide with 1 inch stroke. Total width of sign when mounted is 5 feet 6 inches. Furnished with clamps for mounting on 3″ to 5″ pipe post.

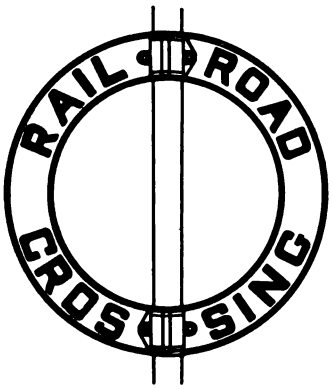
The No. 2007-9 sign is similar in appearance to the No. 705, except with 9 inch letters. Total width of sign when mounted is 7 feet 6 inches.

No. 705. Highway Crossing Sign with clamps for 3″ to 5″ pipe post.

No. 2007-9. Highway Crossing Sign with clamps for 3″ or 4″ I.D. pipe post as specified.

Digitized by Google

Highway Crossing Signs



No. 31. 52" Diameter
No. 85. 42" Diameter

The round sign illustrated to the left is very popular in many parts of the country and presents a pleasing aspect. It is a two-piece cast iron reversible sign lettered on both sides with black letters on white background unless otherwise ordered. Edges are reinforced and letters raised.

No. 31 is 52 inches in diameter with letters 6½ inches high by 3¾ inches wide with 1¼ inch stroke.

No. 85 is identical with No. 31, except its diameter which is 42 inches.

When ordering, specify diameter of pole on which sign is to be mounted and painting desired.

No. 31. Cast iron Crossing Sign with bolts.

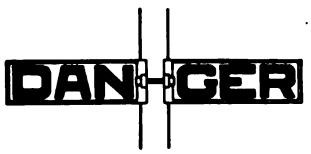
No. 85. Cast iron Crossing Sign with bolts.

No. 2041. Two-piece Cast Iron

The No. 740 Highway Crossing Sign meets the requirements in some localities for a sign reading "Railroad Crossing, Look Out for the Cars." It is a reversible two-piece cast iron sign with reinforced edges and raised black letters on a white background. Total width, 4 feet 8 inches.

No. 2041. Cast iron Crossing Sign for 4" I.D. pipe post.

Some states and other regulatory bodies require danger signs in addition to other prescribed protection.



No. 726. Two-piece Cast Iron

The No. 726 sign is a two-piece sign lettered on both sides with black letters on a white background, unless otherwise specified. Letters are 6 inches high, 5 inches wide with 1⅛ inch stroke. Clamps are designed to fit posts of any diameter from 3" to 5" I.D. Total width when mounted on 4" I.D. pipe post is 4 feet.

No. 726. Cast iron Danger Sign, complete.

No. 3315. One-piece Cast Iron

The No. 3315 Danger Sign is 33 inches long by 9 inches wide with 1 inch border. Letters are black with white background on one side of sign only. Clamps for mounting on 3" to 5" I.D. pipe post are furnished.

No. 3315. Cast iron Danger Sign with clamps.

Where the highway crosses two tracks the railroad is frequently required to place a sign reading "TWO" on the pole below other signs and warning devices to call attention to the fact that it is a double track railroad.

We can supply signs reading "THREE," "FOUR" or any other number for use where required.

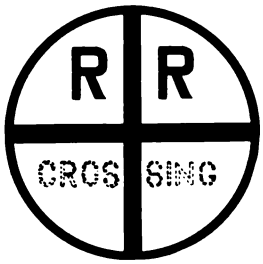
No. 3316. One-piece Cast Iron

The No. 3316 sign has black letters with white background on one side only. The sign is 20 inches by 9 inches with 1 inch border and is furnished with clamp for mounting on 3" to 5" I.D. pipe post.

No. 3316. Cast iron "TWO" Sign with clamps.

Digitized by Google

Approach Warning Signs
Trademark and Monogram Seals



For Single Track

For Two or More Tracks

Approach Warning Signs are required and are being erected in a number of States at points on the highways which are a sufficient distance from the railway to give fast moving highway traffic a warning of approach to railway tracks in time to permit it to stop before crossing.

The standard signs illustrated are 24 inches in diameter, marked with black on a white background in accordance with the recommendations of the A. R. A. These specifications meet the requirements of most of the States. Special signs will be made to order where the standard sign does not meet requirements. The word "CROSSING," which is shown dotted, is not provided unless specified.

The lacquer enamel which we use is specially prepared for out-door use and will withstand all weather and climates. It is the most durable finish obtainable and will not peel nor chip.

Description

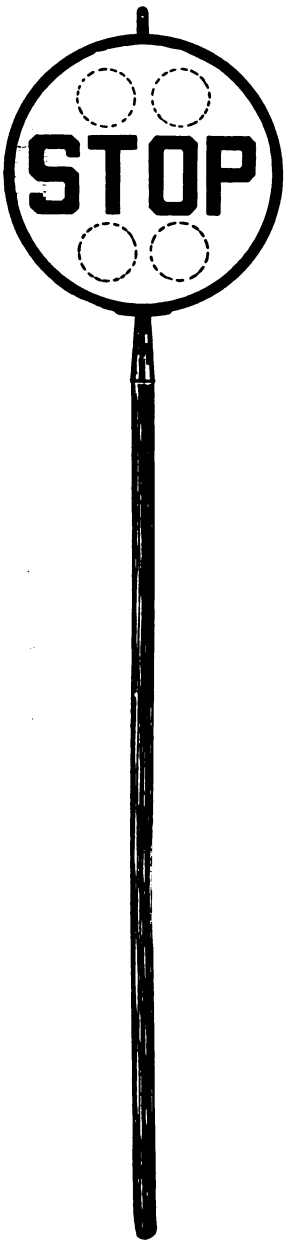
No. 1751. Single track approach warning sign (without "CROSSING").
No. 1752. Single track approach warning sign with "CROSSING."
No. 1753. Double track approach warning sign (without "CROSSING").
No. 1754. Double track approach warning sign with "CROSSING."

Note

SPECIAL SIGNS AND SHIELDS OF A RAILWAY COMPANY'S TRADE-MARK, INITIALS, MONOGRAM, ETC., MADE TO SPECIFICATION.

Digitized by Google

Crossing Watchman's Stop Banner



A crossing watchman can, by holding the STOP banner in view of vehicles and pedestrians, bring to their attention that they must stop.

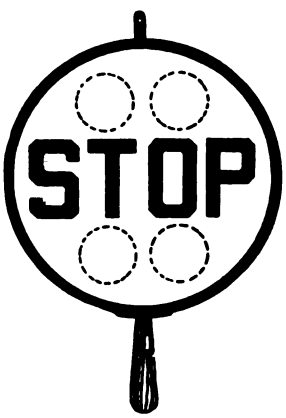
After a great deal of investigation the A. R. A. adopted this type of STOP BANNER (with a short handle) as a standard hand signal for the use of crossing watchmen.

Later it was found that the same style of banner fitted with a five foot staff was superior to the original hand type in that it enabled the crossing watchman to hold the banner aloft, in full view of approaching traffic, with minimum effort.

The banner is made of sheet steel 18 inches in diameter with a substantial wood handle or a 1¼ inch by 5 foot staff as the case may be. The disc is enameled white, and around the outer edge is a ¾-inch black band, while across the center in 5½ inch black letters is the word "STOP" which can be plainly read at a considerable distance. The enamel used is weatherproof and has great lasting qualities.

The marking is exactly the same on both sides so that the indication is given to traffic in both directions.

These banners are also made with holes punched as shown by the dotted lines. This is often desirable when the banners are to be used at crossings which are exposed to a great deal of wind and storm as the banners are more easily held in the proper position when the wind pressure is relieved.



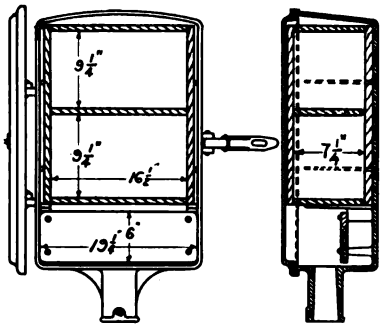
No. 1742-L. Stop banner with 5-foot staff.
No. 1746-S. Hand stop banner (short handle).
No. 1748-L. Same as No. 1742-L except holes are punched.
No. 1750-S. Same as No. 1746-S except holes are punched.

Digitized by Google

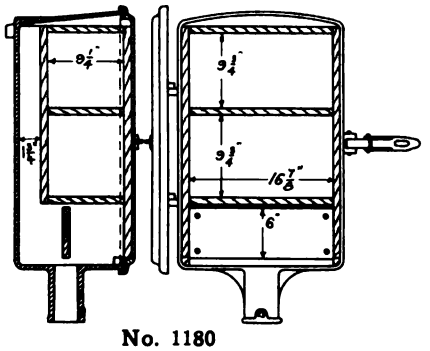
Relay Boxes

CAST IRON WOOD LINED

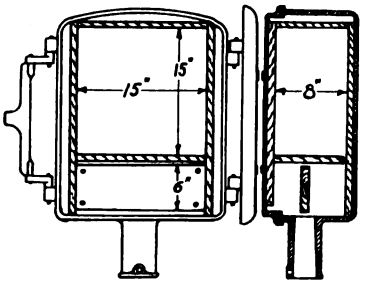
GASKETED DOORS



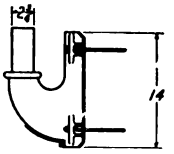
No. 580-C



No. 1180



No. 1704



No. 161

No. 161. Gooseneck bracket for relay boxes, bells, switch indicators, etc. Furnished complete with "U" bolts, can be fitted to any pipe post from 3" to 6" inside diameter.

No. 580-C. Four-way, cast iron, wood lined relay box with terminal board, socket for No. 161 bracket.

No. 580-CB. Same as No. 580-C, except with bushing for wire outlet in back of box.

No. 1180. Four-way, cast iron, wood lined relay box with terminal board, socket for No. 161 bracket.

No. 1180-CB. Same as No. 1180, except with bushing for wire outlet in back of box.

No. 1704. Two-way, cast iron, wood lined relay box with terminal board, socket for No. 161 bracket.

No. 1704-A. Same as No. 1704, except socket for 4" I.D. pipe post or No. 873-29 gooseneck bracket.

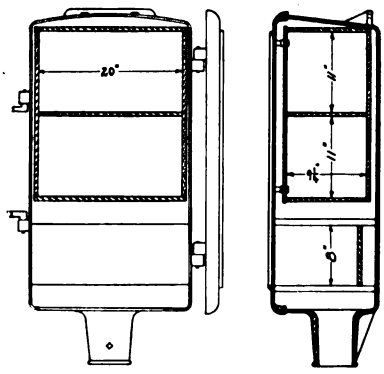
No. 1704-B. Two-way, cast iron, wood lined relay box with terminal board, with socket at top and bottom for 4" I.D. pipe post.

NOTE—Special linings and special shelf arrangements will be furnished to specifications.

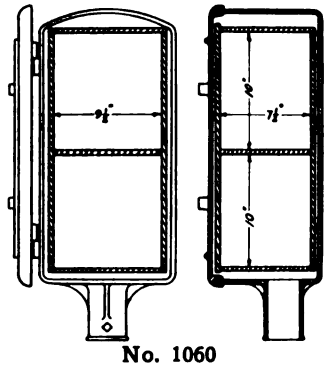
Digitized by Google

Relay Boxes

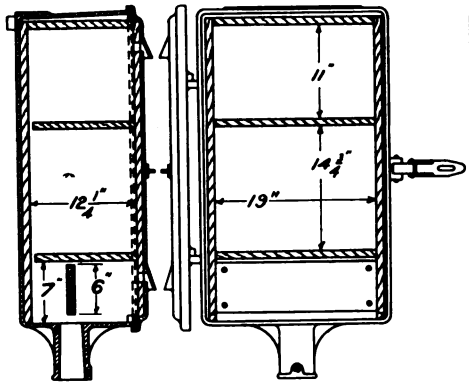
CAST IRON WOOD LINED GASKETED DOORS



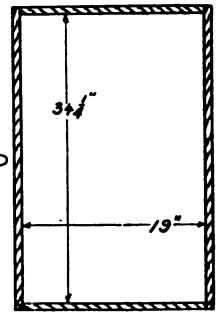
No. 1267



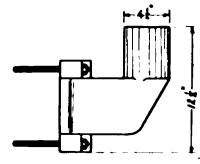
No. 1060



No. 1190-A



Lining "B"



No. 873-29

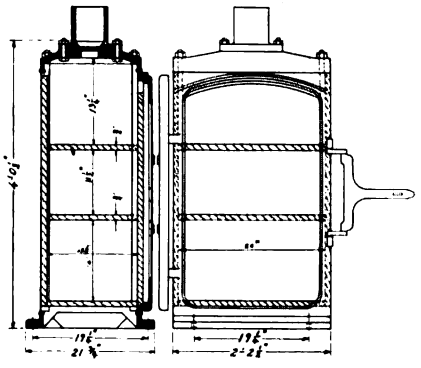
No. 873-29.	Gooseneck bracket with 4½" O.D. socket.
No. 1060.	Two-way wood lined relay box with socket for 4" I.D. pipe post or No. 873-29 gooseneck bracket.
No. 1190-A.	Extra large, cast iron, wood lined relay box with terminal board, socket for No. 161 bracket.
No. 1190AB.	Same as No. 1190-A, except with bushing for wire outlet in back of box.
No. 1190-B.	Same as No. 1190-A, except with lining "B."
No. 1190-A-4.	Same as No. 1190-A, except with socket for 4" I.D. pipe post, or No. 873-29 gooseneck bracket.
No. 1190-B-4.	Same as No. 1190-B, except with socket for 4" I.D. pipe post, or No. 873-29 gooseneck bracket.
No. 1190-A-44.	Same as No. 1190-A, except with socket at top and bottom for 4" I.D. pipe posts.
No. 1190-B-44.	Same as No. 1190-B, except with socket at top and bottom for 4" I.D. pipe posts.
No. 1267.	Relay box, complete with socket for 4" I.D. pipe post, or No. 873-29 gooseneck bracket.
No. 1267-A.	Relay box, complete without sockets.

NOTE—Special linings and special shelf arrangements will be furnished to specifications.

Digitized by Google

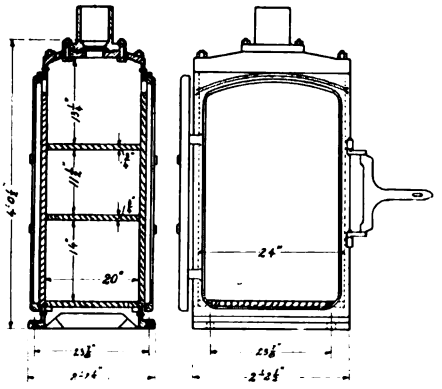
Base of Mast Cases

WOOD LINED



No. 1023. Single Door

GASKETED DOORS



No. 1075. Double Door

These cases are especially useful as combination signal base and housing for batteries, rectifiers, relays, terminals, lightning arresters, etc. They are used extensively in connection with Autoflag Signals, Flashing Light Crossing Signals, Crossing Bells and other signaling apparatus. Special lining and shelving arrangements furnished to specification.

No. 1023. Single door, base of mast relay and battery case with socket for 4″ I.D. pipe post.

No. 1023-5. Single door, base of mast relay and battery case with socket for 5″ I.D. pipe post.

No. 1023-30. Anchor bolts, 1″x30″ for No. 1023 case (set of 4).

The No. 1075 case is slightly larger than the No. 1023 case and while the shelves are not as deep the case will house almost twice the number of pieces of apparatus as the No. 1023. Especially desirable where Batteries, Rectifiers, Control Relays, Track Relays, Flashers and other auxiliary apparatus are located at a crossing protection installation.

Special shelf and lining arrangements furnished to specification.

No. 1075. Double door, base of mast case with socket for 4″ I.D. pipe post.

No. 1075-5. Double door, base of mast case with socket for 5″ I.D. pipe post.

No. 1075-30. Anchor bolts (1″x30″) for No. 1075 case (set of 4).

Digitized by Google

Wood Relay Boxes

BUILT TO ORDER

For housing power companies wattmeters for service switches, etc., a wooden relay box is often used instead of the standard cast iron relay box. A wood box can be secured to wooden poles or the side of buildings much more readily than iron boxes and for this class of service the two standard sizes indicated are found to meet most requirements:

No. 8-X. Dimensions inside—13¼″ wide, 18″ high, 5″ deep.
No. 9-X. Dimensions inside—16½″ wide, 25″ high, 11″ deep.

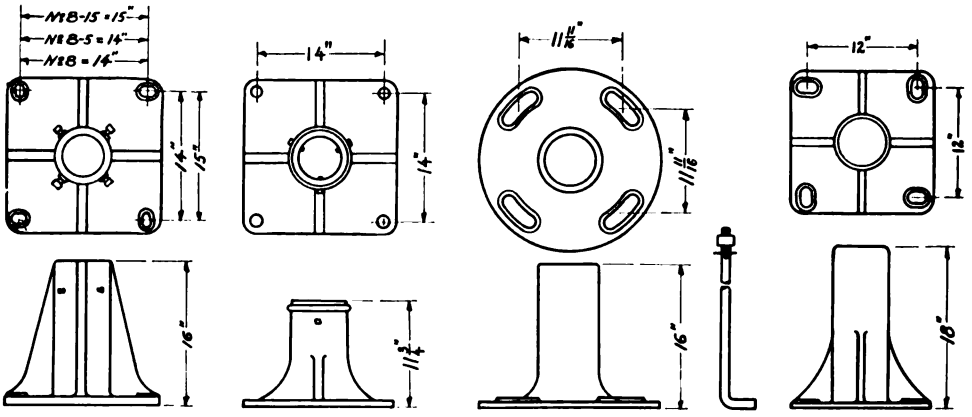
Iron boxes would be entirely too heavy and unwieldy for housing ten or more relays and could not be used very satisfactorily on signal bridges. Therefore, many large wooden relay boxes and battery compartments are used.

We will build wooden relay boxes to specifications or submit plans of special boxes to meet requirements.

Digitized by Google

Signal Bases

BEST QUALITY GREY IRON CASTINGS



No. 8
No. 8-5
No. 8-15

No. 706

No. 44

No. 30
No. 36

No. 874-4
No. 874-20

DESCRIPTION

No. 8. Signal base for 4 inch I.D. pipe post—14 inch c.c. bolt spacing.

No. 8-5. Signal base for 5 inch I.D. pipe post—14 inch c.c. bolt spacing.

No. 8-15. Signal base for 4 inch I.D. pipe post—15 inch c.c. bolt spacing.

No. 30. Anchor bolts, ¾ inch by 30 inches, complete with nuts (set of 4).

No. 36. Anchor bolts, ¾ inch by 36 inches, complete with nuts (set of 4).

No. 44. Signal base for 4 inch I.D. pipe post, A. R. A. bolt spacing.

No. 706. Signal base for 4 inch I.D. pipe post—14 inch c.c. bolt spacing.

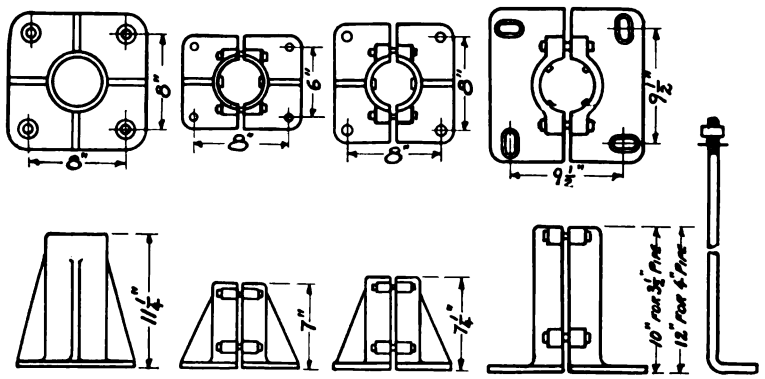
No. 874-4. Signal base for 5 inch I.D. pipe post A. R. A. bolt spacing.

No. 874-20. Signal base for 5 inch I.D. pipe post—12 inch c.c. bolt spacing.

Digitized by Google

Cable Post Bases

BEST QUALITY GREY IRON CASTINGS



No. 883-4 No. 883-5	No. 3 No. 4	"A"	No. 11086 No. 14492	No. 21 No. 24

DESCRIPTION

No. A. Split base for 3″ inside diameter pipe post—8″x8″ bolt spacing.

No. 3. Split base for 3″ inside diameter pipe post—6″x8″ bolt spacing.

No. 4. Split base for 4″ inside diameter pipe post—6″x8″ bolt spacing.

No. 21. ¾″x18″ anchor bolt (set of 4).

No. 24. ¾″x24″ anchor bolt (set of 4).

No. 883-4. Base for 3″ pipe—8″x8″ bolt spacing.

No. 883-5. Base for 4″ pipe—8″x8″ bolt spacing.

No. 11806. Split base for 3½″ inside diameter pipe post. A. R. A.—9½″x9½″ bolt spacing.

No. 14492. Split base for 4″ inside diameter pipe post. A. R. A.—9½″x9½″ bolt spacing.

Digitized by Google

Sub-Base Junction Boxes

CAST IRON

Showing No. 220 Sub-base Junction Box Equipped with 2 Hand Hole Covers, a Trunking Outlet and a Parking Cable Outlet

These cast iron sub-bases are designed to be placed under the regular foundation base on top of the concrete foundation.

They provide a junction box in which to terminate wires from trunking runs and parkway cables as well as openings at the base of the pole for cleaning out rust accumulation. If cleaned out frequently the service life of the pole will be greatly extended and the wires will also last much longer if kept from contact with rust and other substances which accumulate and are injurious to the insulation.

Provision is made to insert a wood strip in the sub-base on which A. R. A. terminals can be mounted. The number of terminals which can be accommodated depends on the available space and varies with the size of the sub-base.

Each sub-base has four openings, one in each side, which are sufficiently large to permit of access to the terminals and which may be fitted with trunking outlets, parkway cable outlets or hand hole covers as desired.

Special sub-bases will be furnished to fit bases having bolt hole spacings other than those listed on the opposite page.

Digitized by Google

Sub-Base Junction Box

(Continued)

The terminal board for the No. 220 sub-base will be furnished with 12 A. R. A. porcelain terminals or less as specified; the No. 230 with 22 terminals or less; the No. 240 with 22 terminals or less; the No. 250 with 24 terminals or less, when specified.

DESCRIPTION

No. 220. Sub-base junction box (illustrated) for 6"x8" bolt spacing, complete with terminal board, hand hole covers and inlets as specified.

No. 221. Sub-base junction box only (no covers or inlets) for 6"x8" bolt spacing.

No. 223. Trunking inlet for No. 221 sub-base.

No. 227. Hand-hole cover for No. 221 sub-base.

No. 228. Parkway cable inlet for No. 221 sub-base (specify O.D. of cable).

No. 230. Round sub-base junction box for 11 1/16"x11 1/16" (A. R. A.) bolt spacing, complete with terminal board, hand-hole covers and inlets as specified.

No. 231. Round sub-base junction box only (no covers or inlets) for 11 1/16"x11 1/16" (A. R. A.) bolt spacing.

No. 233. Trunking inlet for No. 231 sub-base.

No. 237. Hand-hole cover for No. 231 sub-base.

No. 238. Parkway cable inlet for No. 231 sub-base (specify O.D. of cable).

No. 240. Square sub-base junction box for 11 1/16"x11 1/16" (A. R. A.) or 12"x12" bolt spacing, complete with terminal board, hand-hole covers and inlets as specified.

No. 241. Square sub-base junction box only (no covers or inlets) for 11 1/16"x11 1/16" (A. R. A.) or 12"x12" bolt spacing.

No. 243. Trunking inlet for No. 241 sub-base.

No. 247. Hand-hole cover for No. 241 sub-base.

No. 248. Parkway cable inlet for No. 231 sub-base (specify O.D. of cable).

No. 250. Square sub-base junction box for 14"x14" bolt spacing, complete with terminal board, hand-hole covers and inlets as specified.

No. 251. Square sub-base junction box only (no covers or inlets) for 14"x14" bolt spacing.

No. 253. Trunking inlet for No. 251 sub-base.

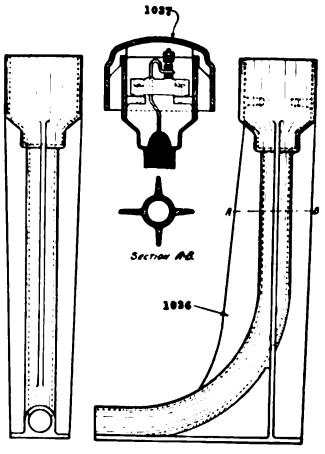
No. 257. Hand-hole cover for No. 251 sub-base.

No. 258. Parkway cable inlet for No. 251 sub-base (specify O.D. of cable).

NOTE—Special sub-bases to fit bases having bolt spacing other than those listed above will be furnished to specifications.

Digitized by Google

Parkway Cable Bootleg Terminal



No. 1035. Complete

A suitable method of terminating Parkway Cable used for track wires is essential to the long life of the cable and the obtaining of satisfactory, reasonably priced, terminals is likewise essential to the economical use of Parkway Cable for this service.

The No. 1035 Parkway Cable Bootleg Terminal has proven eminently satisfactory in service on many railroads. The cast iron post, No. 1036, is imbedded in the ballast beside the track and the Parkway Cable is threaded through the curved hollow stem and terminated on the A. R. A. porcelain terminal in the enlarged chamber. A pocket is provided in the base of this chamber into which pitch or other sealing compound can be poured to seal up the end of the cable to prevent deterioration.

A cast cover rests on top of the chamber permitting wires to be run, free of bushings, etc., from terminal to track connection. This cover acts as a diving bell so that, due to air which remains within the cover, it prevents water from reaching the terminal in cases where the track becomes flooded. It also sheds rain and protects wires and terminal against mechanical injury.

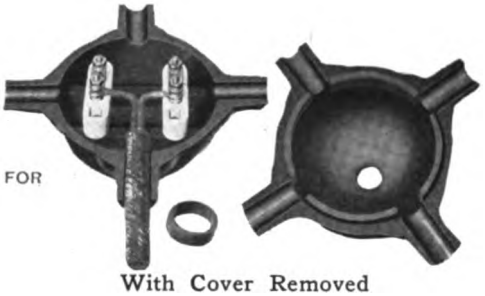
Description

No. 1035. Parkway Cable Bootleg Terminal, complete with terminal and cover.
No. 1036. Parkway Cable Bootleg Terminal, less cover and A. R. A. terminal block.
No. 1037. Cover casting only for Parkway Cable Bootleg Terminal.

Parkway Cable Junction Box

No. 1065. Assembled

PATENT APPLIED FOR



With Cover Removed

To provide a housing in which to splice Parkway Cables for branches or for taking taps from cable runs we have designed the No. 1065 Parkway Cable Junction Box.

Cables are brought in through the long neck openings and secured to the A. R. A. terminals. As many as four A. R. A. porcelain terminals, providing eight binding posts, can be furnished.

The long neck of the openings protect the cable and relieve strain from the electrical connections. Lead bushings, having inside diameters equal to the specified O.D. of the cable and outside diameters to fit in the necks are furnished to provide good mechanical connection of the cable and entrance neck. The fastening rings are to be placed over the cable before connections are made and after applying the cover, these rings are placed on the necks to hold the cover in place while the junction box is filled with sealing compound, through the hole in the cover, to keep out all moisture. Because of the specially designed fins inside the cover, the sealing compound will hold the cover tight and the rings make doubly sure that the cover will not come off or loosen.

When it is necessary to open the junction box, the cover can be loosened by playing the flame of a blow torch on the cast iron body, softening the compound.

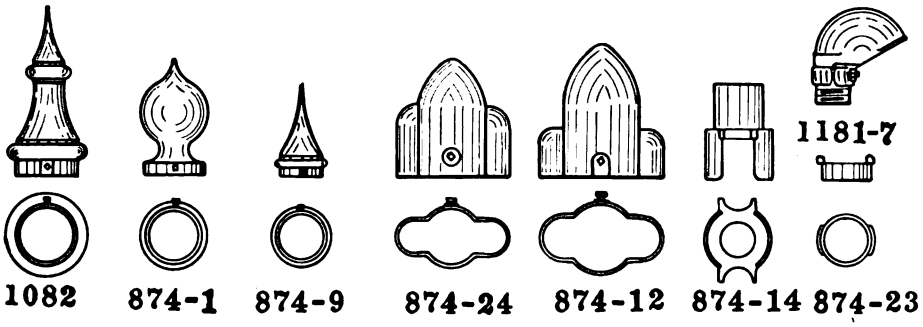
The spherical shape of the junction box allows the sealing compound to completely fill the interior and leave no air pockets. This spherical form also permits the user to bury the junction box in the ballast as its form will glance off all dragging equipment or the blows of trackmen's tools.

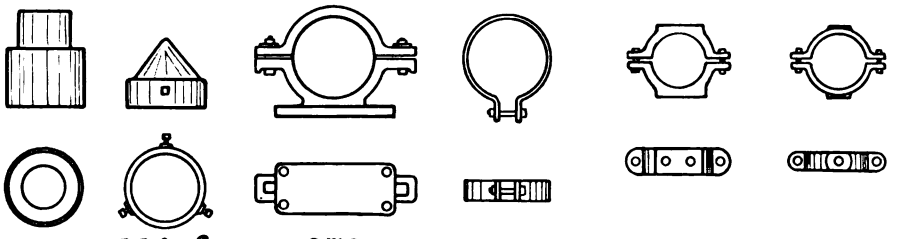
Description

No. 1065. Parkway Cable Junction Box, complete (specify O.D. of cables and number of terminals).

Digitized by Google

Cable Posts and Signal Parts



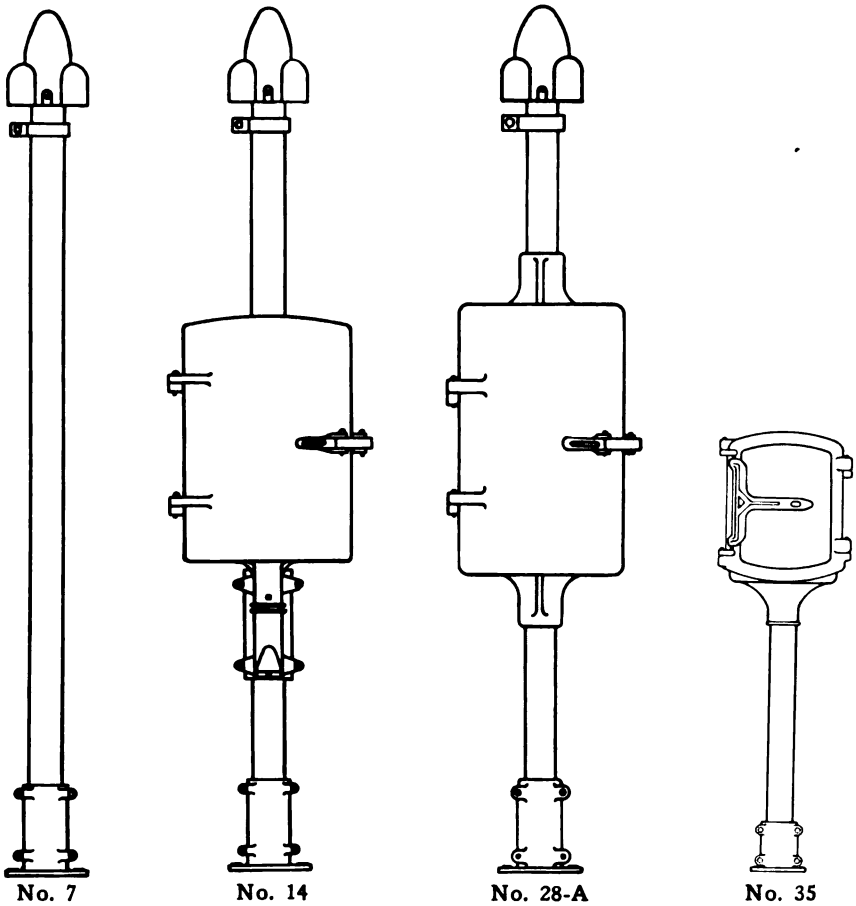


DESCRIPTION

No. 14. Messenger clamp for 3″ I.D. pipe post.
No. 19. Messenger clamp for 3½″ I.D. pipe post.
No. 20. Messenger clamp for 4″ I.D. pipe post.
No. D-25. Reducer for 5″ to 3″ I.D. pipe post.
No. D-27. Reducer for 3½″ to 3″ I.D. pipe post.
No. C-34. Reducer for 4″ to 3″ I.D. pipe post.
No. 110-6. Pinnacle for 4″ I.D. pipe post.
No. 110-7. Pinnacle for 3½″ I.D. pipe post.
No. 513-1. Clamp for 4″ I.D. pipe post.
No. 513-2. Clamp for 5″ I.D. pipe post.
No. 513-3. Clamp for 4″ I.D. pipe post.
No. 513-6. Clamp for 4″ I.D. pipe post.
No. 873-41. Clamp, complete for 3″ I.D. pipe post.
No. 873-42. Clamp, complete for 3½″ I.D. pipe post.
No. 873-43. Clamp, complete for 4″ I.D. pipe post.
No. 873-44. Clamp, complete for 5″ I.D. pipe post.
No. 874-1. Pinnacle for 4″ I.D. pipe post.
No. 847-9. Pinnacle for 3″ I.D. pipe post.
No. 874-12. Cable post pinnacle for 3″ I.D. pipe post.
No. 874-14. Cable post bushing for 3″ I.D. pipe post.
No. 874-23. Cable post bushing for 4″ I.D. pipe post.
No. 874-24. Cable post pinnacle for 4″ I.D. pipe post.
No. 990-63. Reducer for 5″ to 4″ I.D. pipe post.
No. 1082. Pinnacle for 4″ I.D. pipe post.
No. 1181-7. Cable inlet (A. R. A. Dwg. 1181).

Digitized by Google

Standard Cable Posts



No. 7 | No. 14 No. 21 | No. 28-A No. 28-B | No. 35 No. 35-A

The Nos. 7 to 28-B Cable Posts illustrated are of standard construction, of 4 inch inside diameter pipe post, 9 feet high. They are provided with messenger wire clamp and pinnacle for admission of wires at top of post. No. 35 and No. 35-A are furnished with 3 feet of pipe, unless otherwise specified.

Special designs or variations from those illustrated furnished to specification.

No. 7. 9 foot cable post, complete with base, pinnacle and messenger clamp.

No. 14. 9 foot cable post, complete with base, pinnacle, messenger clamp and No. 580-C relay box with bracket.

No. 21. 9 foot cable post, complete with base, pinnacle, messenger clamp, and No. 1704 relay box with bracket.

No. 28-A. 9 foot cable post, complete with base, pinnacle, messenger clamp and No. 1190A44 relay box.

No. 28-B. Same as No. 28-A, except with No. 1190B44 relay box.

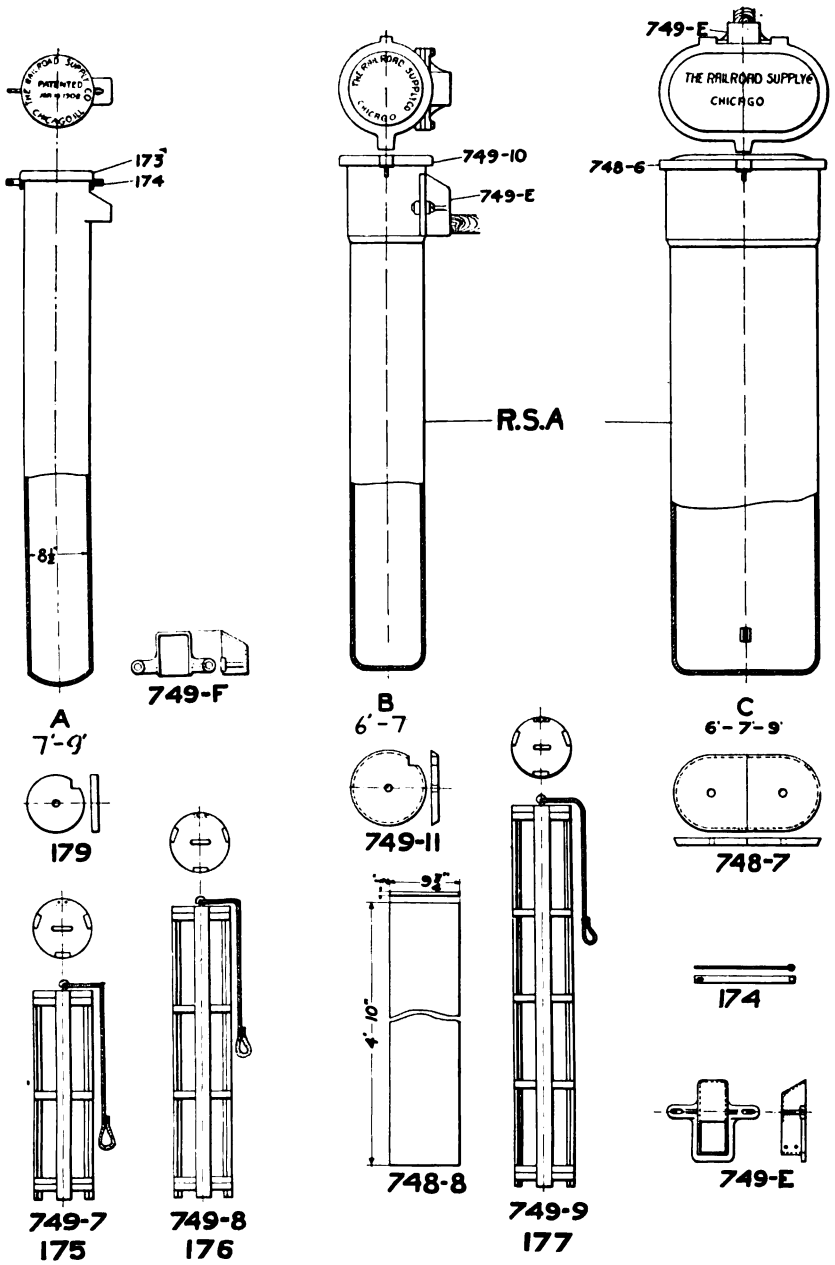
No. 35. Cable post as shown, complete with No. 1704 relay box, split base and pipe post.

No. 35-A. Same as No. 35, except with No. 1060 relay box.

NOTE—Relay boxes shown on pages 140 and 141.

Digitized by Google

Battery Chutes



Digitized by Google

Battery Chutes

Only the best quality of grey iron is used in the manufacture of our Battery Chutes. All bodies are cast in one piece with heavy walls free from burrs, knobs or blow holes and heavily painted with a rust-preventing paint.

The style "A" has trunking outlet cast on the body. Furnished in 7 ft. and 9 ft. lengths only.

Styles "B" and "C" are equipped with either 749-E or 749-F trunking hood as specified.

Elevators furnished ready wired when so ordered.

No.	Description
166.	2-Cell, Style A, 7-ft. battery chute, complete.
167.	3-Cell, Style A, 7-ft. battery chute, complete.
168.	4-Cell, Style A, 7-ft. battery chute, complete.
169.	2-Cell, Style A, 9-ft. battery chute, complete.
170.	3-Cell, Style A, 9-ft. battery chute, complete.
171.	4-Cell, Style A, 9-ft. battery chute, complete.
172.	Style A, 7-ft. body, only.
173.	Cover for Style A.
174.	Lock rod for Style A.
175.	2-Cell elevator for Style A.
176.	3-Cell elevator for Style A.
177.	4-Cell elevator for Style A.
178.	Style A, 9-ft. body, only.
179.	Frost cover for Style A.
748.	4-Cell, Style C, 6-ft. battery chute.
748-1.	4-Cell, Style C, 7-ft. battery chute.
748-2.	4-Cell, Style C, 9-ft. battery chute.
748-3.	6-Cell, Style C, 6-ft. battery chute.
748-4.	6-Cell, Style C, 7-ft. battery chute.
748-5.	6-Cell, Style C, 9-ft. battery chute.
748-6.	Cover for Style C.
748-7.	Frost cover for Style C.
748-8.	Dividing board for Style C.
749.	2-Cell, Style B, 6-ft. battery chute.
749-1.	2-Cell, Style B, 7-ft. battery chute.
749-3.	3-Cell, Style B, 6-ft. battery chute.
749-4.	3-Cell, Style B, 7-ft. battery chute.
749-7.	2-Cell elevator for Styles B and C.
749-8.	3-Cell elevator for Styles B and C.
749-9.	4-Cell elevator for Styles B and C.
749-10.	Cover for Style B.
749-11.	Frost cover for Style B.
749-E.	Trunking hood for Styles B and C.
749-F.	Trunking hood for Styles B and C.

Digitized by Google

Cast Iron Battery Boxes

These boxes are waterproof. Have wooden floors and a trunking entrance on one end when specified.

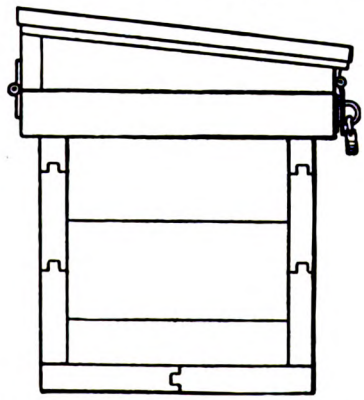
Description

No. 14. Cast iron battery box, inside measurements 15x15x28 inches. To hold 8 cells of A. R. A. battery.

No. 16X. Cast iron battery box, inside measurements 16x16x39 inches. To hold 10 cells of A. R. A. battery.

No. 822. Cast iron battery box, inside measurements 30x16x30 inches. To hold 16 cells of A. R. A. battery.

Wood Battery Box



These boxes are made of first-grade white pine, tongue and groove, and with galvanized water-shed roof. They are well painted inside and outside. Two sizes carried in stock and special sizes furnished when required.

Description

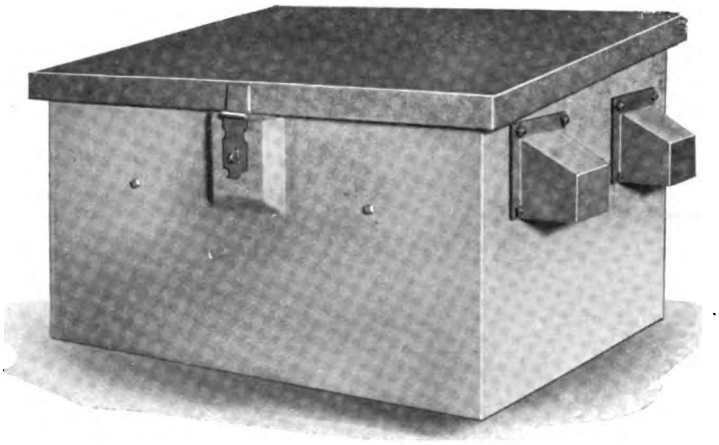
No. 12. Wood battery box, inside measurements, below frost board, 36x26x20 inches. To hold 12 cells of A. R. A. Primary battery.

No. 18X. Wood battery box, inside measurements, below frost board, 52x26x20 inches. To hold 18 cells of A. R. A. Primary battery.

Digitized by Google

Concrete Battery Box

A. R. A. SIG. SEC. DRAWING 1343



OUTSIDE DIMENSIONS

FOR STORAGE BATTERY					FOR PRIMARY BATTERY				
No.	No. Cells	Length	Width	Height	No.	No. Cells	Length	Width	Height
13431	40	6′-0″	4′-6″	2′-8″	13434	40	6′-0″	4′-6″	2′-8″
13432	20	4′-4″	3′-3″	2′-8″	13435	20	4′-4″	3′-3″	2′-8″
13433	12	2′-3″	2′-7″	2′-8″	13436	12	2′-7″	2′-3″	2′-8″

When ordering, specify whether for Storage or Primary Battery and the number of outlet covers and outlet caps desired.

Used to house Storage or Primary batteries. Has metal reinforcement and is waterproof. Furnished with metal trunking caps and metal hoods protecting vent openings.

Cover is made of galvanized iron having wood lining.

Digitized by Google

Concrete Battery Tub

Type 10-E **Capacity, 10-A. R. A. Cells**
Type 3-E **Capacity, 3-A. R. A. Cells**
(Reinforced)

Type 10-E

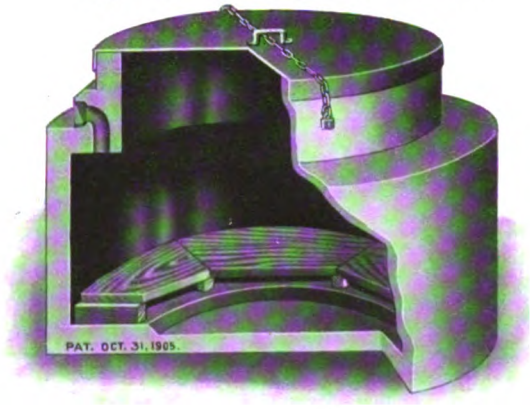
Type 3-E

DIMENSIONS

Measurement	Type 10-E	Type 3-E
Diameter	Outside 2′-8″, inside 2′-4″	Outside 1′-9″, inside 1′-5″
Height	Over all 2′-6″, floor to frost cover 1′-8″	Over all 2′-6″, floor to frost cover 1′-11″

Concrete Battery Vault

Type 16-E **Capacity, 16 Cells**



No. 41. Battery Vault, with single wire outlet.
No. 42. Battery Vault, with double wire outlet.

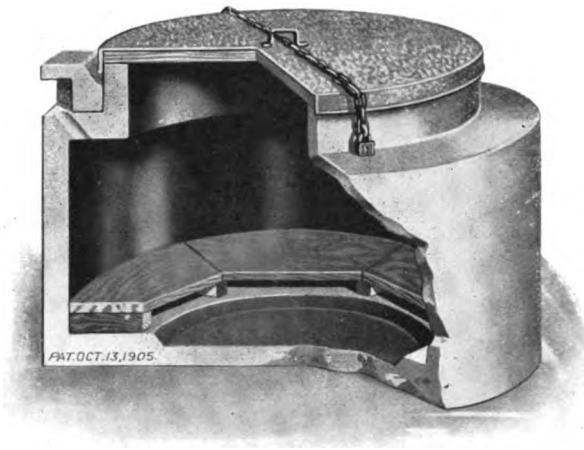
DIMENSIONS

Diameter—Outside, 4 feet; inside, 3 feet 8 inches.
Height over all—2 feet 10 inches. Floor to roof, 1 foot 9 inches.
Manhole—Inside dimension, 2 feet 4 inches; height, 11 inches.
Weight—1,500 pounds.

Digitized by Google

Concrete Battery Vault

Type 32-D Capacity, 36 Cells



No. 51. Battery Vault, with single wire outlet.
No. 52. Battery Vault, with double wire outlet.

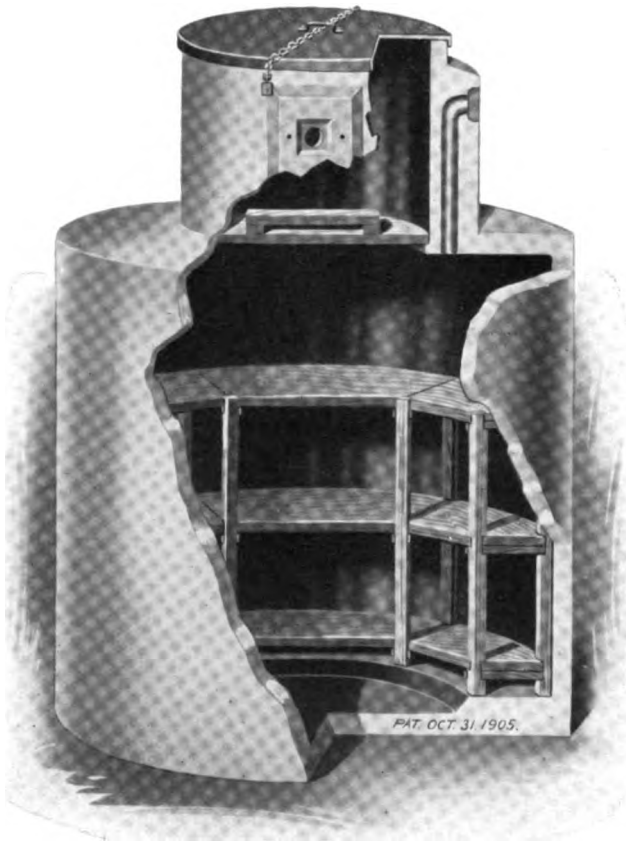
DIMENSIONS

Diameter—Outside, 5 feet 2 inches; inside, 4 feet 10 inches.
Height over all—2 feet 6 inches. Floor to roof, 1 foot 10 inches.
Manhole—Inside dimension, 3 feet 4 inches; height, 6 inches.
Weight—2,200 pounds.

Digitized by Google

Concrete Battery Vault

Type 60-Standard Capacity, 60 Cells



Single Frost Cover—Square Shoulder

No. 21. Battery Vault, with single wire outlet.
No. 22. Battery Vault, with double wire outlet.

DIMENSIONS

Diameter—Outside, 5 feet 2 inches; inside, 4 feet 10 inches.
Height—Over all, 7 feet. Floor to roof, 5 feet.
Manhole—Inside dimension, 2 feet 4 inches; height, 1 foot 10 inches.
Shelves—Distance between, 1 foot 3 inches.
Weight, 4,300 pounds.

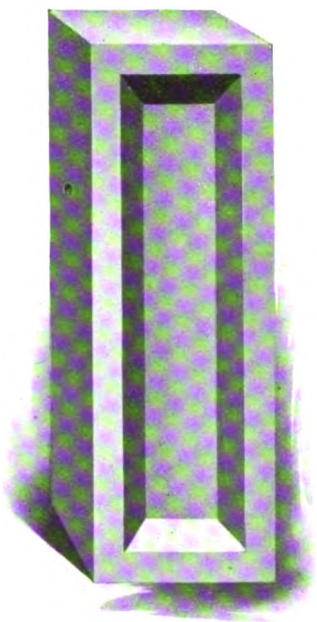
Double frost cover furnished when specified. Battery Vaults of larger capacities up to 96 A. R. A. cells will be manufactured to order.

Digitized by Google

Concrete Pipe Carrier Foundation

A. R. A. DRAWING No. 1080

No. 10801



No. 10802

DESCRIPTION

No. 10801. A. R. A. Standard Pipe Carrier Foundation.

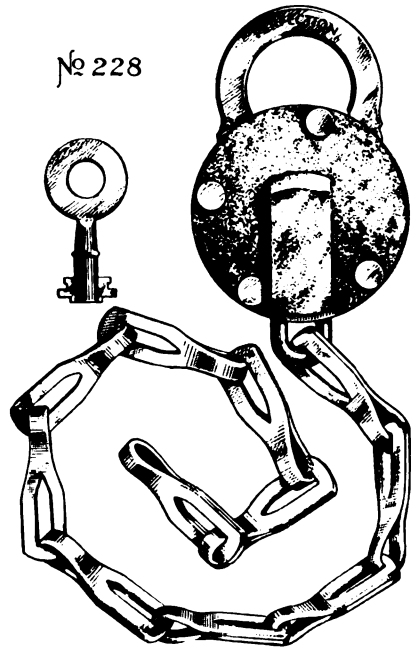
No. 10802. A. R. A. Pipe Carrier Foundation (extra deep).

Digitized by Google

Padlocks With Keys

CAST BRONZE

PERFECTION LOCK



Perfection padlocks have 8 levers with two keys, locks are worked with double bitted key, turning indefinitely both ways. Cannot get out of order or be picked. Furnished with staple and 13-inch chain unless otherwise ordered.

Specify whether or not all keys are to be alike.

No. 228. Perfection padlocks, complete.

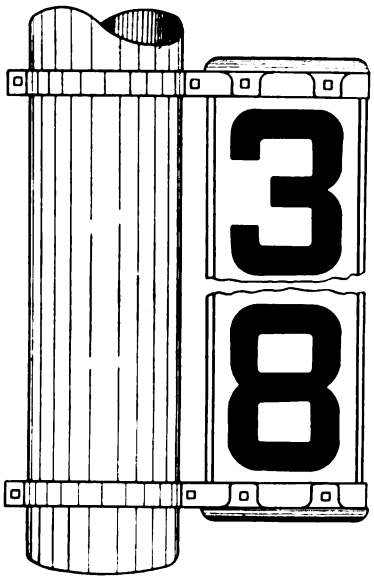
Signal Lock

The No. 164 Standard Signal Lock is made from bronze and will not become inoperative from exposure to weather. The keyhole is protected by a spring latch. Keys are all alike, so only one key is necessary to open any lock of this pattern.

No. 164. Standard Signal Lock.
No. 165. Standard Key.

Digitized by Google

Number Plate Holder



No. 3307. Applied

The use of baked enameled steel figures for signal number plates insures long life and clear distinct figures which may be cleaned repeatedly.

The No. 3307 number plate holder has channeled sides in which to slide the number plates having the figures and other symbols required. Individual enameled steel letters and figures are used to make up any number desired.

The holder is well constructed and provided with clamps for mounting on the side of pole of specified diameter. They are made to order, for any size plates, of varying lengths to accommodate any number of letters, figures or symbols desired.

We will furnish number plate holders complete with letters or figures assembled in any series ordered or will furnish the holders and plates separately for assembly as they are applied to the signal masts.

No. 3307. Number Plate Holder only. (Specify size of figure or width of plate or both and length of holder or number of digits to be used.)

No. 3307-X. Number Plate Holder complete with letters, numbers or symbols as specified.

No. 3307-Y. Plates for use with No. 3307 number plate holder. (Specify markings and sizes.)

Digitized by Google

Section 5

Contents

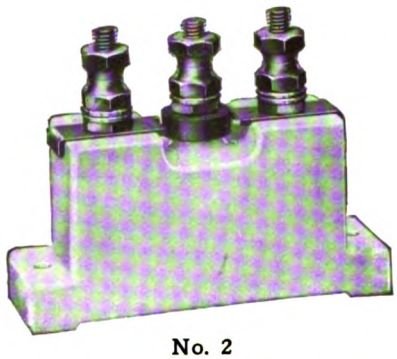
LIGHTNING ARRESTERS
SPARK GAP PLATES
GROUND RODS
PARAGON GROUNDS
RESISTANCES
RHEOSTATS
MARKING TAGS
TERMINALS
CONNECTORS

Digitized by Google

Premier Lightning Arresters

DESCRIPTION OF No. 2 PREMIER ARRESTER

Patented



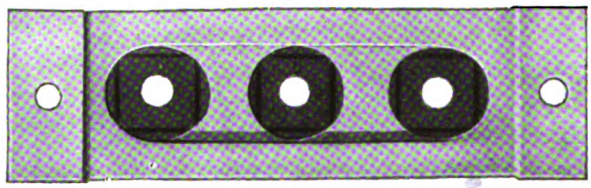
No. 2

The containing block is of heavy porcelain. On the top or face of the block are mounted two copper saw-tooth spark plates with a disc of carbon between them.

The carbon discs used are ¼" thick by ¾" in diameter and are of a special homogeneous grade designed to eliminate the possibility of disintegration and to have great mechanical strength.

On the inside of the block are two recesses, each containing a reactance coil in the shape of a helix. The upper end of each of these coils is connected to the posts which hold the copper plates in place, while the lower end of the coils are connected together, thus placing the two coils in series. The center post which supports the carbon disc is entirely insulated from the other metallic parts of the arrester. The design is such that there is a heavy wall of porcelain between each reactance coil and the center post, thus there is absolutely no danger of a spark occurring on the inside of the block.

Owing to the fact that the reactance coils are wound in the form of a helix, the difference of potential to which they may be subjected is so distributed that there is no possibility of a spark occurring between the adjacent convolutions. From the above description it will at once be seen that the only point where a spark can occur is across the gap between the spark plates and the carbon disc which is connected to the ground. To prevent any longitudinal movement of the copper spark plates, they are turned down over the edge of the porcelain block. It is, therefore, impossible for the spark plates to move closer to the carbon ground disc.

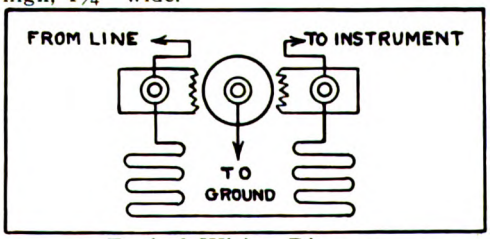


Bottom of Arrester Base

Heavy Porcelain Walls

After the reactance coils have been placed in position, the whole inner part of the block is completely filled with insulating compound.

These arresters are all equipped with standard A. R. A. posts, nuts and washers, and with each one is furnished a copper strip for connecting the ground posts of adjacent arresters when they are banked, also wood screws for mounting are included. In fact, everything necessary for the rapid installation of the device is received with the arrester itself. Dimensions are: 4⅛" long, 3¼" high, 1¼" wide.



Typical Wiring Diagram

SERVICE INSTALLATION

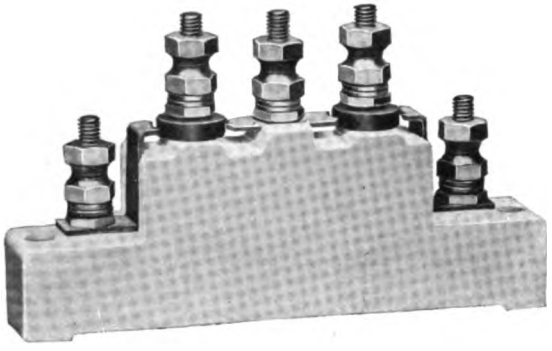
The installation of these arresters is a very simple matter, it being only necessary to fasten them in place, connect the wire from the line on one end post, the wire from instrument to the other end post, and the wire leading to the ground on the center post. When several arresters are banked side by side, all the ground posts are connected together by means of the copper strips and the ground wire is connected to the center post at either end of the bank.

Digitized by Google

Premium Lightning Arresters

DESCRIPTION OF No. 3 PREMIER ARRESTER

Patent No. 1296362



No. 3

It is a well known fact that in a great many instances a greater amount of protection from lightning trouble is secured if the apparatus is so arranged that a discharge can dissipate or equalize itself on the rails in addition to the regular artificial ground connection.

Under some conditions also, a charge appears in the rails themselves. This charge in some cases flows toward the track relay and oftentimes causes trouble at this point. If this current from the rails is given a path to the ground, the charge is dissipated and carried away without any harm to the apparatus.

The rail grounding feature is incorporated in the No. 3 Arrester in addition to the regular choke coil and spark gap construction of No. 2 Arrester.

All posts are rigidly mounted on a porcelain block in such a manner that they are in a straight line, allowing the arrester to be made very narrow.

This arrester has five posts, as follows: Two for rail connections, one for artificial ground, one for line connection and one for instrument connection. The internal construction is the same as the No. 2 Arrester. All sparking points are copper to carbon. The carbon discs used in these arresters are ¼" thick by ¾" diameter, and are of a special homogeneous grade, designed to eliminate the possibility of disintegration and to have great mechanical strength.

The design of the porcelain base is such that all the posts are securely held in their proper position with absolutely no liability of becoming deranged and causing a ground.

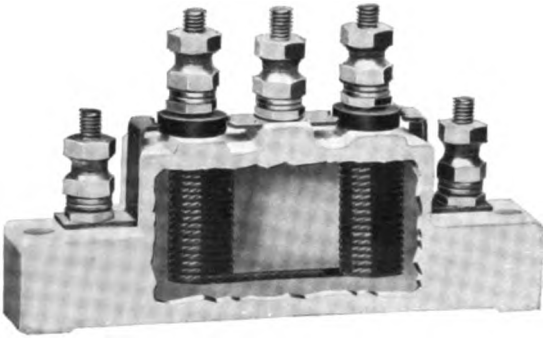


FIGURE 1

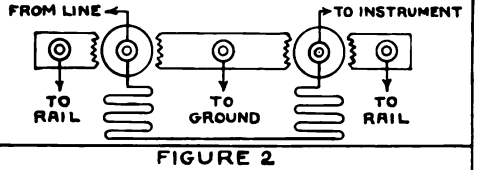
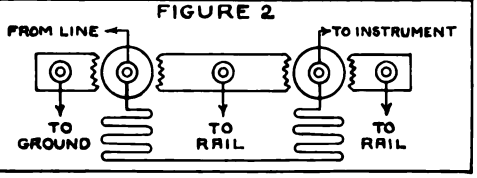


FIGURE 2



The dimensions are 1⅛" wide, 5⅞" long, 3⅜" high.

With each arrester is furnished three copper strips for connecting the arresters when they are banked, also wood screws for mounting are included. Like the No. 2, this arrester comes complete, ready for service installation.

Figs. 1 and 2 show different methods of connecting the No. 3 Arrester. Fig. 1 shows the usual method of connecting. Fig. 2 shows the standard method of wiring adopted by one of the largest railroads in the country. Both methods, however, will give the maximum protection afforded by the No. 3 Arrester.

Digitized by Google

No. 4-A Lightning Arresters

CHOKE COIL—SPARK GAP

For Low Voltage D. C. Circuits

The No. 4-A Lightning Arrester is a modification of our famous No. 2 Arrester, hundreds of thousands of which are now affording unequaled lightning protection to thousands of signaling devices throughout the world.

In all essentials the No. 4-A Arrester is the same as the No. 2. The saw tooth copper spark plates and the carbon blocks are identical. The choke coil, while of a slightly different shape, gives the same protective results. It is of ample capacity for use on signal circuits up to 30 volts D. C. It not only carries the signal circuit through the arrester from the line to the instruments, but stems back lightning charges, causing them to go to ground over the small gap from the copper saw tooth plates to the carbon disc on the ground terminal.

The Quenched-Gap feature will be incorporated in this arrester when specified as is done with the famous No. 2 and No. 3 Premier Arresters described on the previous pages.

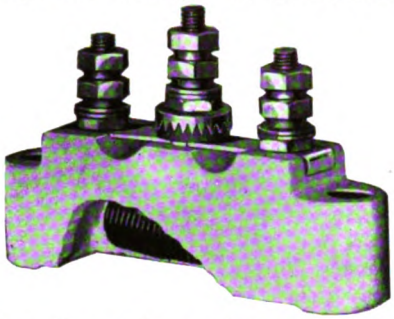
The glazed porcelain block on which this arrester is assembled is 1 inch wide by 4½ inches long and the over all height of the arrester is 2⅝ inches. Being of the same width these arresters will bank up on a terminal board with A. R. A. porcelain terminals, which is advantageous in a great many cases.

Digitized by Google

No. 4-B Lightning Arresters

CHOKE COIL—SPARK GAP—CARBORUNDUM

For Low Voltage D. C. Circuits



To those who prefer the carborundum type of lightning arrester for protection of signal circuits, we offer our No. 4-B combination choke coil, air-gap and carborundum arrester.

The ability of carborundum to free the line from light static charges and of the choke coil to stem back heavy lightning charges, causing them to go to ground through the carborundum or over the gap between the plates and saw tooth cup washer, securing the carborundum, are both taken advantage of in the superior design and construction of this arrester.

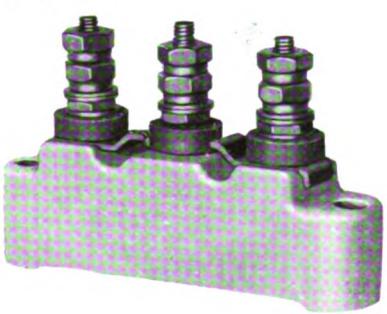
The long years of experience of so many railroads with hundreds of thousands of lightning arresters of our design and manufacture assures the purchaser that the No. 4-B Arrester is the best of its type.

The choke coil is of ample capacity for use on any signal circuits up to 30 volts D. C. All metal parts are strong and durable, well finished and securely locked in correct position.

The porcelain block is of the same dimensions as that used on the No. 4-A, so that this arrester will also bank up with A. R. A. porcelain treminals.

No. 4-H Lightning Arresters

For 110 Volt 60 Cycle Circuits



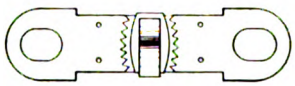
The No. 4-H Lightning Arrester is ideal for use in 110 volt 60 cycle circuits, when the current flow is limited, by fuses or other means, to 30 amperes or less.

It is essentially the same as the No. 4-A Arrester, illustrated on the opposite page, except that carborundum discs are placed on the line binding posts, increasing the resistance between line and ground without impeding the free passage of lightning discharges from line to ground. The resistance introduced is sufficient to prevent the line current from following through when lightning discharges have established a path to ground.

This arrester is highly recommended for use in the primary circuit of Rectifier installations, etc.

Digitized by Google

Spark Gap Plate



The No. 100-12 spark gap plate, designed to be placed across relay coil terminals, provides brass to carbon sparking surfaces which will not fuse closed.

It provides cheap, efficient lightning protection for track relays.

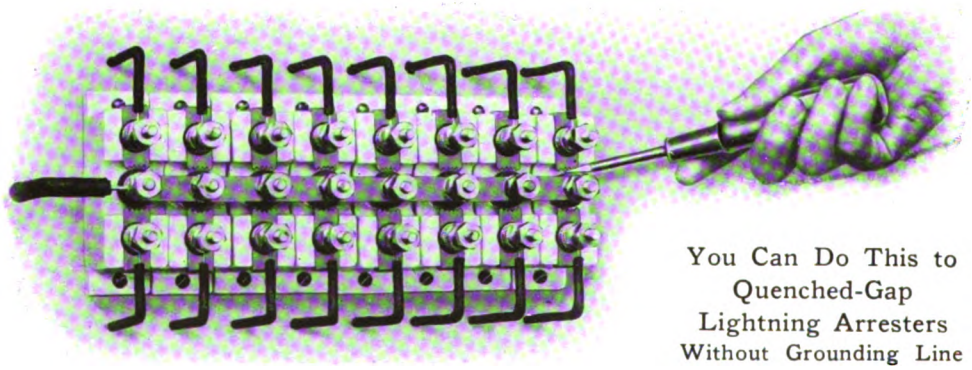
The carbon block is held in place by a phosphor bronze spring and can be replaced, if necessary, without removing the spark gap from the relay.

No. 100-12. Spark Cap Plate.

Premier Lightning Arresters

QUENCHED-GAP TYPE

Patent No. 1260750



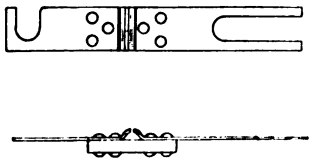
You Can Do This to Quenched-Gap Lightning Arresters Without Grounding Line

The quenched-gap feature has added a wonderful improvement to our well known types of spark gap arresters. With this feature should the gap to ground become bridged by a cinder, drop of water, piece of metal or anything whatever, the signal current cannot flow to ground because the line circuit is insulated from the spark-plate by a thin insulating washer of peculiar design.

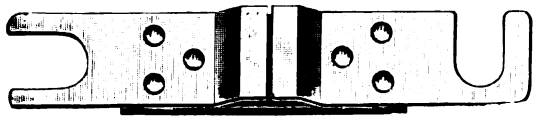
The quenched-gap feature can be incorporated in the No. 2 and No. 3 and No. 4 Arresters when specified.

Digitized by Google

Spark Gap Plates



100-6



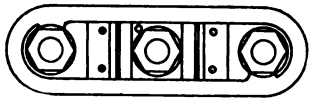
No. 2426

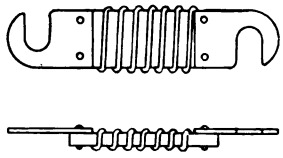
These Spark Gap Plates are designed to be placed across the coil posts of relays, etc., to allow a static or lightning discharge to jump the small gap of .032 inch instead of going into the coils. The No. 100-6 is furnished with long slot so that the plate may be placed on ¼-inch binding posts of any spacing from 2⅞ inches to 3 inches center to center. The No. 2426 is designed for placing on ¼-inch binding posts spaced 2⅜ inches center to center.

No. 100-6. Spark Gap Plate.

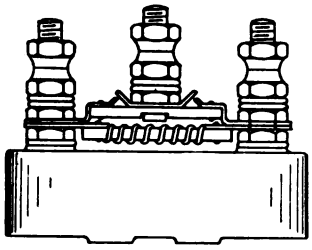
No. 2426. Spark Gap Plate.

No. 85-D Lightning Arrester

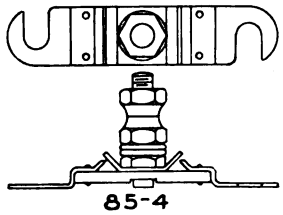




85-3



85-D



85-4

The No. 85-D Lightning Arrester is of the choke coil, spark gap type mounted on an A. R. A. porcelain terminal block. All three binding posts are A. R. A. standard.

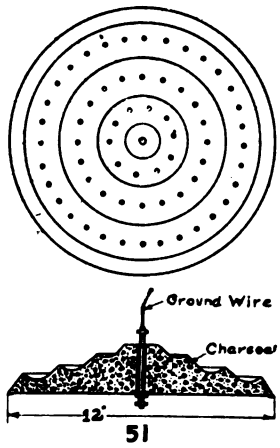
The choke coil is wound on a fibre block and covered with an insulating material which is baked, giving complete protection against moisture and mechanical injury. This coil is of low resistance, but high reactance and therefore will not affect the normal current, but will offer high resistance to static and lightning discharge.

The spark gap plate is mounted in multple with the coil so that high frequency charge will go to ground over the spark gap rather than overcome the high reactance of the choke coil.

No. 85-D. Lightning Arrester, complete.
No. 85-3. Choke Coil for No. 85-D Arrester.
No. 85-4. Spark Gap for No. 85-D Arrester.

Digitized by Google

No. 51 Ground Plates



The No. 51 Ground Plate has 275 square inches of sheet copper surface, every spot of which is exposed to the earth.

Interior of Ground Plate is filled with charcoal which, on being dampened at the time of installation, will retain its moisture for a great length of time, even in dry locations. This insures a very low ohmic resistance between the earth and the copper construction.

This Ground Plate is so constructed that three sharp edges are provided for the ready dissipation of any static discharge. A split tube is provided to fasten the wire connecting the lightning arrester to the plate. The wire slips into the tube and is then fastened with jam nuts. This eliminates all unnecessary kinking and soldering of the wire.

The construction of this Ground Plate permits tamping of earth securely against all parts of the device without injury to the construction.

No. 51. Ground Plate.

Galvanized Ground Rods

Rod

For the proper grounding of lightning arresters in signal service and also the grounding of lightning arresters and neutrals in power and light service, **Ground Rods** are very extensively used and have proven to be a very satisfactory method of obtaining ground connections.

Our ground rods are made of tough mild steel, very heavily galvanized. One end is pointed to facilitate driving, while the other end is drilled for the reception of the ground wire. A $\frac{9}{32}$" hole for using No. 8 B. W. G. wire and a standard channel pin will be drilled, unless otherwise specified.

The rods can be furnished in the following standard sizes:

No. 500.	¼	inch x 4 feet.	Galvanized.
No. 500-A.	⅜	inch x 5 feet.	Galvanized.
No. 502.	½	inch x 6 feet.	Galvanized.
No. 503.	½	inch x 7 feet.	Galvanized.
No. 504.	¾	inch x 8 feet.	Galvanized.
No. 504-A.	¾	inch x 9 feet.	Galvanized.
No. 505.	1	inch x 9 feet.	Galvanized.

Ground rods of other sizes will be made to order.

Digitized by Google

Paragon Grounds

Made of one continuous piece of pure No. 22 sheet copper from bottom of ground to point of connection with leading-in wire above surface of the earth. Five feet of No. 4 Soft Copper connecting wire furnished with each ground. Give permanent protection to electrical equipment from excess potential and high tension crossed.

Cost little. Easily, economically and quickly installed. Require no attention or maintenance expense after being installed; always on the job and to be depended upon in case of emergency.

Made in two hollow shapes, cones and cylinders, one-foot length and two-foot length as the capacity demanded may require. The cones are perforated to give ample discharge points and filled with charcoal to attract and hold moisture in the ground around the cone. The cylinders are not perforated and are furnished either filled with charcoal or open at both ends with no charcoal filling as conditions may require.

This ground is extensively used in electric light and power installations and for grounding lightning arresters, etc., in connection with automatic signals.

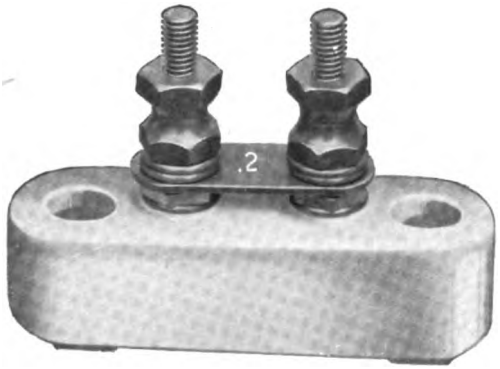
SIZES

	Shape	Length
No. 1.	Cylinder (solid)	1 ft.
No. 2.	Cylinder (solid)	2 ft.
No. 3.	Cone (perforated)	1 ft.
No. 4.	Cone (perforated)	2 ft.

All No. 22 gauge copper.

Digitized by Google

Resistance Unit No. 7312



This unit is contained in an A. R. A. Terminal Block and is equipped with A. R. A. binding posts. It is very extensively used in connection with potash batteries on track circuits. Can be furnished in any desired resistance from 1/10 to 1 ohm.

Wood screws for mounting are not furnished, unless order so specifies.

No. 7312. Resistance Unit. Capacity, 20 watts. (Specify resistance.)

Resistance Unit No. 7318

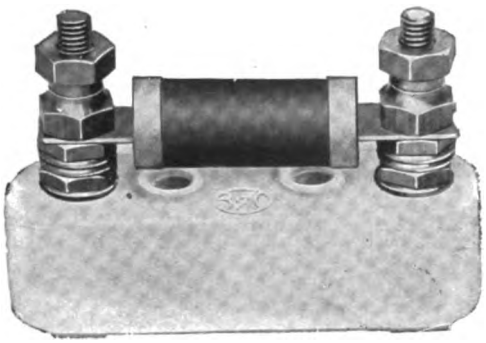
The No. 7318 Resistance Unit is designed to fit an A. R. A. Terminal and will be found very suitable for introducing small resistances into circuits already installed.

This Unit can be furnished in any desired resistance up to 5 ohms.

No. 7318. Resistance Unit only. Capacity, 20 watts. (Specify resistance.)
No. 7318-C. Resistance Unit, complete with A. R. A. terminal. Capacity, 20 watts. (Specify resistance.)

Resistance Unit No. 7314

CARTRIDGE TYPE



This Unit consists of an A. R. A. terminal block on which is placed a cartridge type resistance, made from 1/10 to 25 ohms resistance. The resistance cartridge is protected against damage and is easily changed without removing the connecting wires. Designed especially for use in connection with primary batteries on track and other signal circuits. Capacity, 20 watts.

Wood screws for mounting are not furnished unless order so specifies.

No. 7314. Resistance Unit, complete. (Specify resistance.)
No. 7314-L. Resistance Unit Cartridge only. (Specify resistance.)

Resistance Unit No. 7316

SPOOL TYPE

The No. 7316 Resistance Unit is of the same general appearance as the No. 7314, except that the resistance wire is wound on a fibre spool which is fitted with connections to fit an A. R. A. porcelain terminal. Any resistance from 25 ohms up to 5000 ohms can be furnished in this type of unit. Capacity, 20 watts.

No. 7316. Resistance Unit, complete. (Specify resistance.)
No. 7316-L. Resistance Unit Spool, only. (Specify resistance.)

Digitized by Google

Vitrohm Resistor Units

(Vitreous Enameled)

Vitrohm Resistor Units are made with a great variety of terminals to meet railway signaling requirements and other standard assembly practices.

We illustrate herewith four of the most commonly used types and solicit inquiries concerning special styles.

Type R.S.A. on Terminal Block

TYPE R.S.A. RESISTOR UNIT

Type R.S.A. Resistor Units are furnished with or without A. R. A. terminal block in any specified resistance from 0.1 ohm to 8000 ohms.

Capacity, 30 watts.

Type R.S.A.

Vertical Type R.S.A. **for Mounting on Terminal Block**

VERTICAL TYPE R.S.A. RESISTOR UNIT WITHOUT BASE

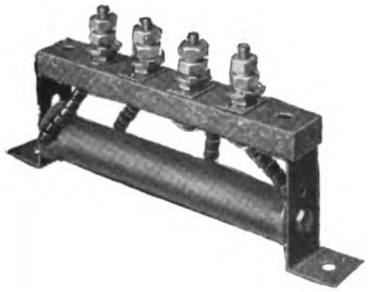
The vertical type R.S.A. Resistor Unit can be furnished with any specified resistance from 0.1 to 22,000 ohms.

The continuous carrying capacity is 60 watts. For 20 seconds duty the capacity is 210 watts.

Type E.B. Resistor Unit Edison Base Mounting

TYPE E.B. RESISTOR UNIT

This unit, equipped with Edison screw base, can be furnished in any resistance from 0.2 ohm to 1000 ohms. Continuous capacity, 60 watts. Capacity for 20 seconds duty, 210 watts.



Adjustable Track Circuit Resistor Unit

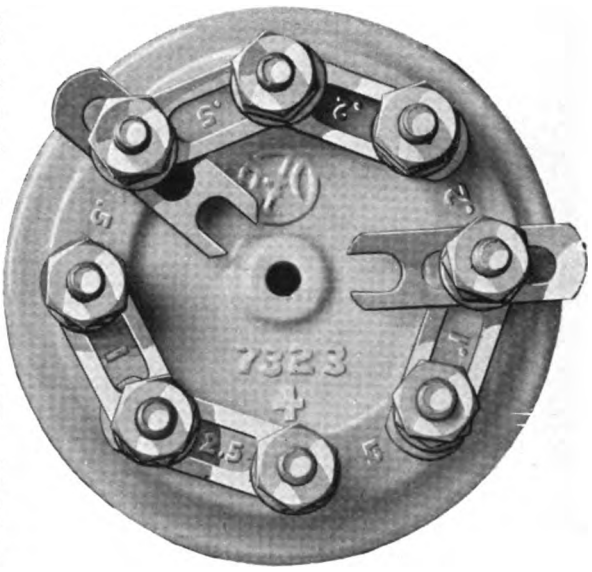
ADJUSTABLE TRACK CIRCUIT RESISTOR UNIT

Various total resistances with the desired taps can be furnished in this style of unit. The most commonly used is listed below.

Total 1 ohm in steps of 0.1, 0.2, 0.3 and 0.4 ohm.

Digitized by Google

No. 7323 Universal Variable Track Resistance



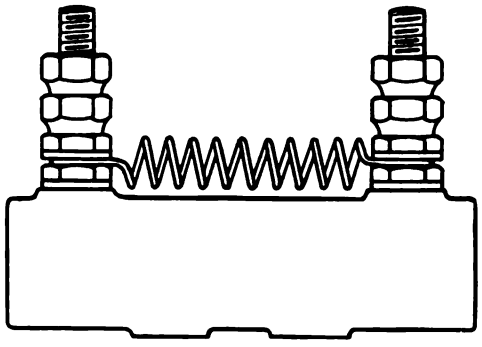
Our No. 7323 Universal Variable Track Resistance is variable in 1/10 ohm steps from 1/10 ohm to 5 ohms. It was specially designed for use in track circuits where storage battery is used, but it is universally adaptable to track circuits fed by either storage or primary battery.

The resistance consists of No. 18 enameled nichrome wire in the 2½ and 1 ohm steps and No. 16 in the smaller steps. The No. 18 will carry 5 amperes and the No. 16 will carry 6 amperes without overheating. There are no soldered connections to loosen at high temperature and therefore ample protection against lightning and accidental high currents is provided.

The convenient form, 8 binding posts secured in a circular porcelain 3¾" in diameter, is worthy of consideration. The over all height of the resistance is 2⅜". The binding posts are A. R. A. Signal Section standard and reliable connections can be made. As in the construction of our lightning arresters, terminals and other resistance units, the square heads of the binding posts are set in square recesses cast in the porcelain so that they cannot turn. There are no small screws to loosen or sliding contacts to corrode. The connections are positive, as on any piece of signaling apparatus.

No. 7323. Universal Variable Track Resistance.

No. 7325 Fixed Track Resistance



The No. 7325 Fixed Track Resistance consists of No. 16 Bare Nichrome wire coiled five turns per 1/10 ohm and secured on an R.S.A. terminal as shown.

Being exposed to the air the wire has more than 6 amperes carrying capacity without overheating. A current of more than 12 amperes is required to raise the temperature to 950 degrees Fahrenheit and the melting point is 2750 degrees Fahrenheit. There are no soldered connections to loosen at high temperatures. Ample protection is provided against burning out by lightning and accidental high currents.

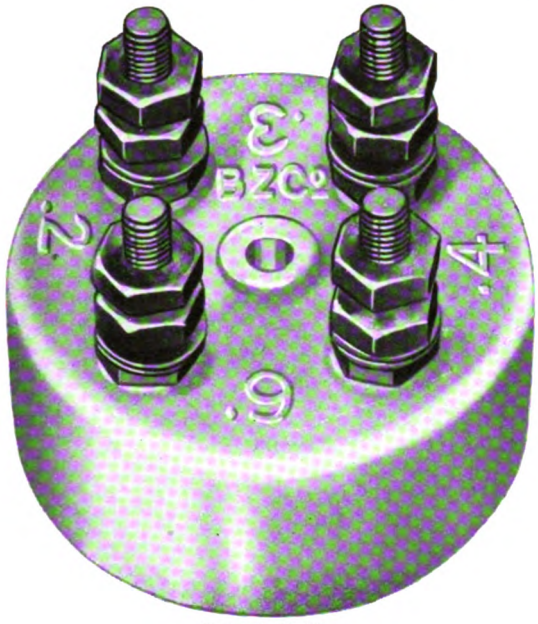
The maximum resistance which can be furnished in this form is 4/10 ohms (20 turns of wire). Frequently those using this unit place one in each lead from the battery to the track making possible a maximum of 8/10 ohm in the circuit.

Where storage battery is used on track circuits it will often be found convenient to use a fixed resistance of this type in the negative track wire and our No. 7323 variable resistance in the positive lead.

No. 7325-1. Fixed resistance of .1 ohm
No. 7325-2. Fixed resistance of .2 ohm
No. 7325-3. Fixed resistance of .3 ohm
No. 7325-4. Fixed resistance of .4 ohm

Digitized by Google

Variable Resistance Unit No. 7321



Cut Full Size

The No. 7321 Variable Resistance Unit was primarily designed for use in primary battery track circuits for which it has been eminently satisfactory. It consists of a circular porcelain block in which four A. R. A. non-turning posts are mounted.

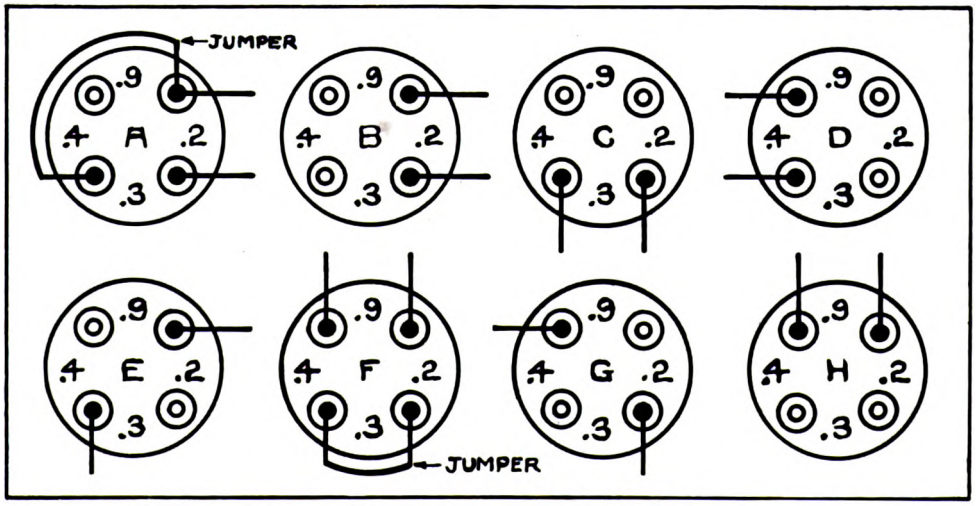
The wire in this unit is continuous and is looped under the different binding posts, thus doing away with all soldered connections.

Connections are to be made to A. R. A. binding posts, eliminating all sliding contacts and small adjusting screws making the unit as reliable and rugged as a fixed resistance.

Packed one in a carton with one blued wood screw for fastening.

No. 7321. Variable Resistance with wood screw for mounting.

DIAGRAMS OF CONNECTIONS

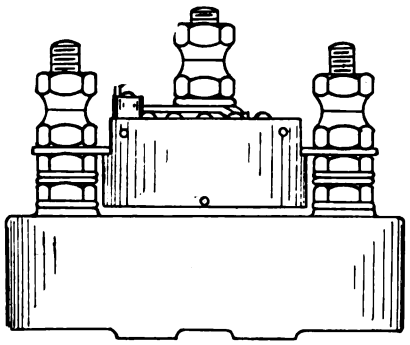


A—Connections for .12 ohm.
B—Connections for .2 ohm.
C—Connections for .3 ohm.
D—Connections for .4 ohm.
E—Connections for .5 ohm.
F—Connections for .6 ohm.
G—Connections for .7 ohm.
H—Connections for .7 ohm.

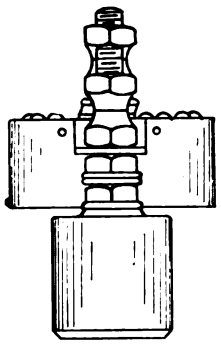
No. 7321. Variable Resistance Unit, with wood screw for mounting.

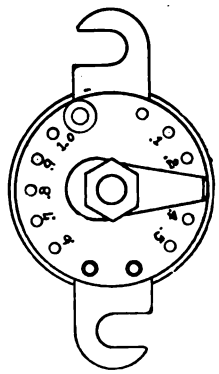
Digitized by Google

Variable Resistance Unit No. 1252



No. 1252





No. 1252-2

The No. 1252 Adjustable Resistance Unit is adjustable in steps of 1/10th ohm from 0 to 1 ohm. The circuit is **never opened** in changing from one resistance to another. The cartridge is mounted on an A. R. A. Terminal Block.

The resistances of the above unit are plainly marked.

No. 1252. Resistance Unit, complete 0 to 1 ohm.

No. 1252-2. Cartridge only for No. 1252.

Variable Resistance or Rheostat

Mounted on Insulating Base with A. R. A. Terminals for Connections

The use of Rectifiers in connection with the A. C. Floating Battery System of charging storage batteries permanently located at signals necessitates the use in some cases, of a variable resistance or rheostat for controlling the charging rate.

The Rotary Type Variable Resistance, illustrated herewith, is particularly adapted to this use as well as many others where it is desired to introduce a variable resistance in a circuit.

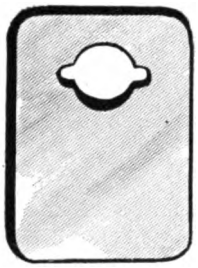
The standard sizes carried in stock have maximum resistances of 25 and 45 ohms. Rheostats with other maximum resistances may also be furnished.

No. 8325. Rotary Type Variable Resistance or Rheostat (specify maximum resistance).

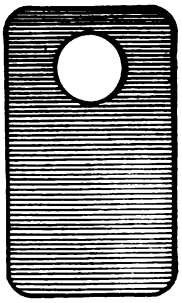
Digitized by Google

Marking Tags

Fibre 1/16" Thick
Black, Red, Grey, White
Aluminum or Brass

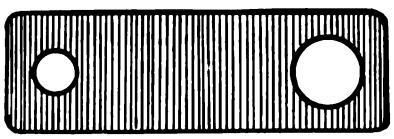


No. 01
7/8"x1 1/4", 3/8" winged hole.



No. 1
7/8"x1 1/2", 3/8" hole.
No. 21
7/8"x1 1/2", 5/32" hole.
No. 22
7/8"x1/2", 1/2" hole.

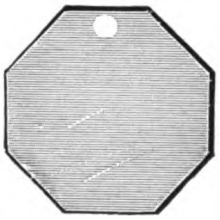
No. 23
5/8"x1 1/2", 1/8" hole.



No. 7
5/8"x2", 1/4" hole and 3/8" hole.

Tube Tag
No. 9
1 1/4" long, 1/4" I.D., 3/8" O.D
No. 9-C
5/8" long, 3/8" I.D., 1/2" O. D.
No. 14
5/8" long, 1/4" I.D., 3/8" O.D.

No. 2
7/8"x7/8", 3/32" hole.
No. 24
7/8"x7/8", 5/32" hole.



No. 5
1 3/16" octagonal, 5/32" hole.

No. 10
1 3/32" round, 1/4" hole.
No. 26
1 3/32" round, 5/32" hole.

No. 1053
3/8"x1 1/4"x3/32" thick.
Two 5/16" holes, 7/8" c.c.

No. 15
31/32" round, 1/8" hole.
No. 25
31/32" round, 5/32" hole.

Note: Black fibre tags will be furnished unless other color or Aluminum or Brass are specified.

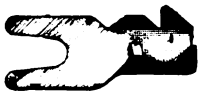
Digitized by Google

Wire and Cable Terminals

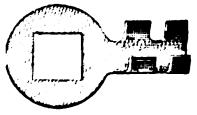
COPPER OR BRASS

(Cuts Actual Size)

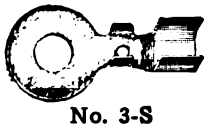
No. 0-S



No. 1-S



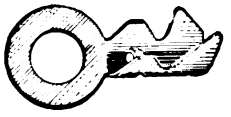
No. 2-S



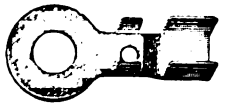
No. 3-S

No. 4-S

No. 13-S

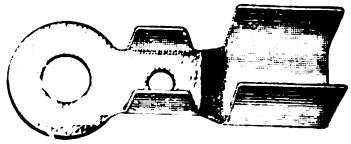


No. 14-S

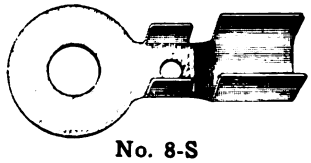


No. 5-S

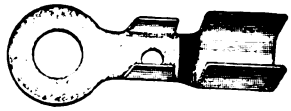
No. 11-S



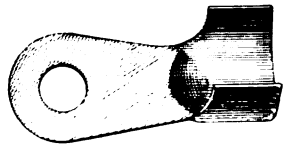
No. 9-S



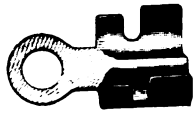
No. 8-S



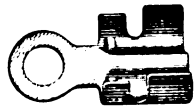
No. 7-S



No. 55-S



No. 16-S



No. 17-S

No. 25-S

No. 27-S

No. 34-SN Plated

No. 19-S

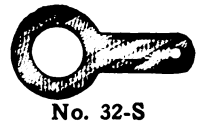
No. 21-S

No. 22-S

No. 24-S

No. 26-S

No. 36-SN Plated



No. 32-S

No. 6-S

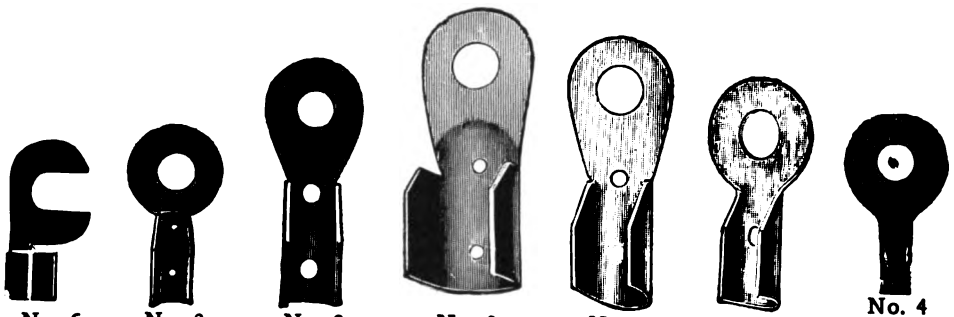
No. 10-S

Order by number. Specify copper or brass as required and gauge of metal. Stud holes of special diameter furnished to order.

Digitized by Google

Copper Terminals

CUTS FULL SIZE

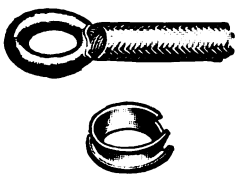


No. 6 No. 3 No. 2 No. 0 No. 1 No. 2½ No. 4 No. 5

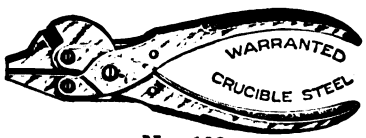
These terminals are made of heavy, pure Lake Copper, 98 per cent conductivity.

Number	Length, Inches	Diameter Hole, Inches	Outside Diameter Cable, Inches	Number	Length, Inches	Diameter Hole, Inches	Outside Diameter Cable, Inches
0.	1½	¼	½	3.	1	3/16	3/16
1.	1 7/16	¼	5/16	4.	15/16	3/16	⅛
2.	1 5/16	3/16	¼	5.	13/16	¼ Fits A. R. A. Post	⅛
2½.	1⅛	7/32	3/32	6.	15/16	¼ Fits A. R. A. Post	⅛

Wire Eyelets—Wire Eyelet Pliers



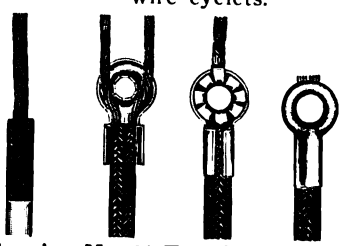
No. 10
Wire Eyelet



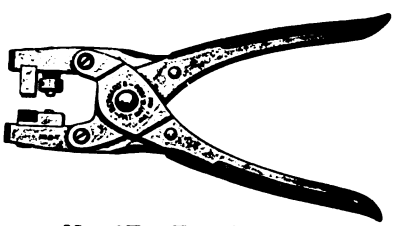
No. 102
Wire Eyelet Pliers

No. 10. Brass Wire Eyelet for No. 14 to No. 18 stranded or flexible wire, to fit 14/24 A. R. A. binding posts.

No. 102. Smooth face parellel jaw cutting pliers for attaching No. 10 and similar wire eyelets.



Showing No. 21 Terminal (½ size)



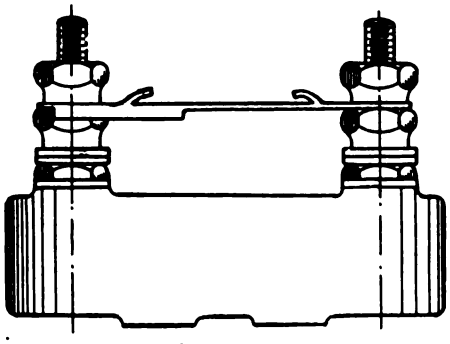
No. 2T. Terminal Tool

No. 21. Brass Wire Terminal for No. 14 to No. 18 wire to fit 14/24" A. R. A. binding post. Other sizes to order.

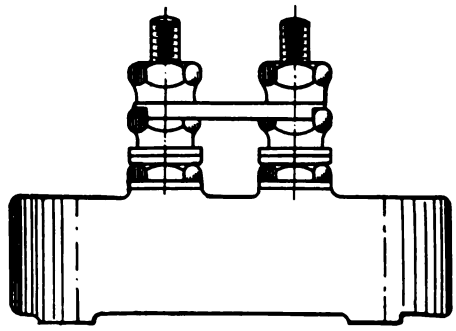
No. 2-T. Terminal Tool for attaching No. 21 ferrule type wire terminal. Tools for other sizes of terminals to order.

Digitized by Google

A. R. A. Terminal Blocks

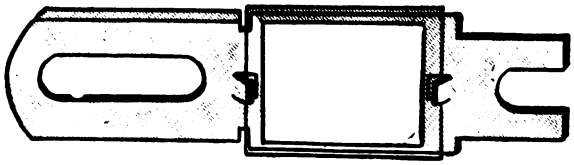


No. 10565
(Old catalogue No. 32363)



No. 10563
(Old catalogue No. 32361)

Our long link copper connector has two small upset ears under which marking tags may be fastened. Either fibre tags for marking with steel letters and figures or white bristol board, with celluloid covering, for marking with pen and ink may be used on these connectors.



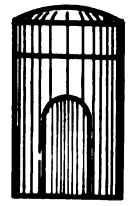
At the left is shown copper connector, No. 10564 with No. 32365 white bristol board tag and celluloid covering applied.

No. 10562. Short copper connector.

No. 10563. A. R. A. porcelain terminal complete (binding posts spaced 1" C. to C.).

No. 10564. Long copper connector (without tag).

No. 10565. A. R. A. porcelain terminal complete (binding posts spaced 2⅜" C. to C.).



No. 32370

No. 10566. Binding post complete (with nuts and washers).

No. 10567. Binding post only (14-24 thread).

No. 10706. Binding nut.

No. 10707. Thin hexagon clamp nut.

No. 10708. Washer.

No. 32364. Fibre marking tag for connector No. 10564. (Black fibre furnished unless otherwise specified.)

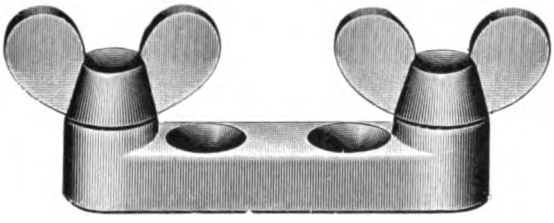
No. 32365. White bristol board tag and celluloid covering complete for connector No. 10564.

No. 32370. A. R. A. binding post insulator.

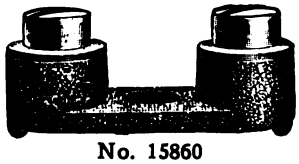
Digitized by Google

Brass Terminals

CUTS FULL SIZE

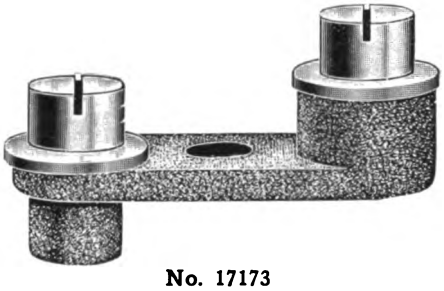


No. 20500

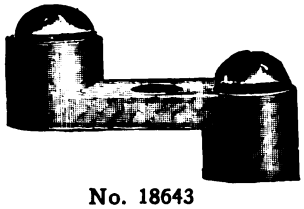


No. 15860

No. 20500. Heavy Cast Brass Terminal, with two heavy cast wing nuts.
No. 15860. Heavy Cast Brass Terminal, with two heavy screws and washers.



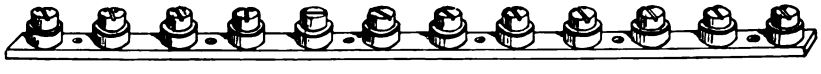
No. 17173



No. 18643

No. 17173. Heavy Cast Brass Terminal, with heavy screws and washers.
No. 18643. Heavy Cast Brass Terminal, with two screws.

(Cut one-third size)



No. 20600

Twelve Connection Bus Bar Terminal, connections spaced 1 inch center to center. Heavy cast brass with screws and washers. Useful for common connections in relay box wiring, etc.

(Cut one-half size)

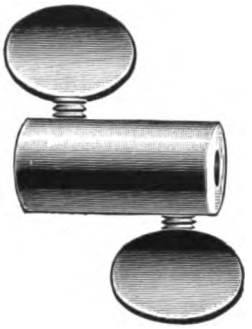
No. 20700

No. 20700. Double End Connector, with three nuts and two washers each end. Turned from hexagon brass rod. No. 14-24 thread and standard A. R. A. nuts and washers. Useful for suspended joints which would usually be soldered. Can be covered for insulation, with two No. 32370 binding post insulators.

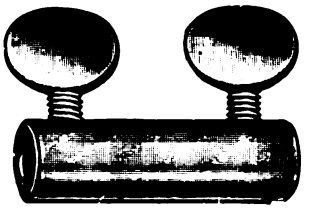
Digitized by Google

Connectors—Binding Posts

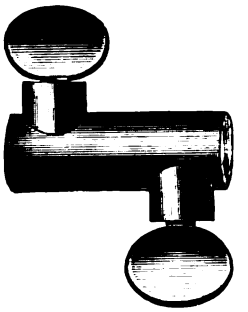
CUTS FULL SIZE



No. 2

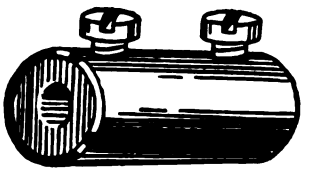


No. 5

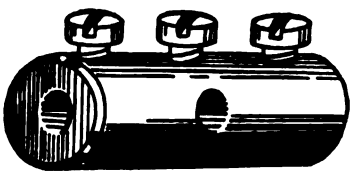


No. 4

No. 2. Double connector, two heavy brass screws, A. R. A. thread.
No. 4. Double connector, two heavy brass screws.
No. 5. Double connector, two heavy brass screws, grooved cylinder.



C. S. 103-2



C. S. 103-3

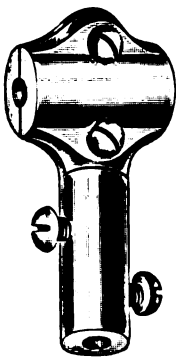
C. S. 103-2. Two screw brass connector.
C. S. 103-3. Three screw connector.
C. S. 103-4. Four screw connector.

No. 13156

Brass binding post, nickel plated when specified.

No. 19800

Insulated brass connector, two screws. Fibre insulation. Unless otherwise specified one-half the quantity ordered will be furnished with red fibre insulation and one-half with black insulation.



No. 188

"T" Connector. Specify size of wire for run and tap.

No. 3001 — Same, except two parallel holes in head and hole for soldering wire into leg instead of two screws in leg.

Digitized by Google

Section 6

Contents

WIRE
RAIL BONDING SUPPLIES
DRILLING MACHINES
TRUNKING and CAPPING
S. M. PIN LOCKS and BUSHINGS
STUFFING BOXES
SWITCH ROD INSULATIONS
PIPE LINE INSULATIONS
INSULATED RAIL JOINTS
CHICAGO DERAILER
TIE PLATES

Digitized by Google

Parkway or Suburban Cable

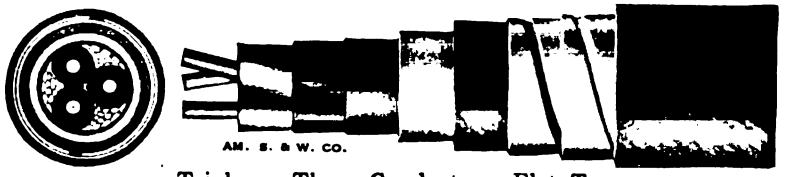
STANDARD FORMS

Solid or Stranded Conductors

Single Conductor. Flat Tape

Single Conductor. Armorlokt Steel Tape

Flat Twin or Two Conductor. Flat Tape



Triple or Three Conductor. Flat Tape

Parkway or suburban cable is available in three general forms, i.e., single conductor, two conductor and three conductor. It can be furnished with any number of conductors desired, of any size larger than No. 10 B. & S. gauge.

It will be furnished with either flat steel tape or the Armorlokt steel tape as specified.

Solid copper conductor is furnished in No. 6 and smaller B. & S. gauge and 7 strand copper conductor is furnished in No. 2 and No. 4 B. & S. gauge. Nos. 1, 1/0, 2/0, 3/0 and 4/0 conductors are furnished in 19 strand copper.

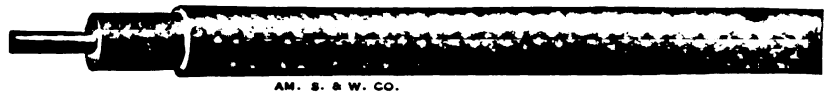
These cables can be supplied insulated for 600 volt service, 2500 volt service or 5000 volt service as specified.

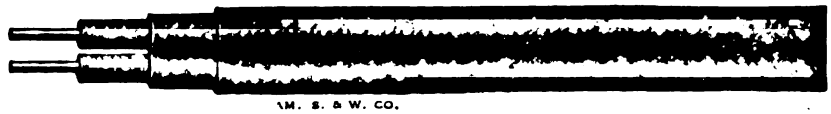
Detailed specifications and prices furnished upon request.

Digitized by Google

Insulated Wires

A. R. A. SIGNAL SECTION AND N. E. C. SPECIFICATIONS





Insulated copper wire can be furnished with any grade of insulation desired for any class of service or type of installation, solid, stranded or flexible.

All sizes are available with any standard grade of insulation. No. 14, No. 12 and No. 9 B. & S. gauge solid, insulated in accordance with A. R. A. Signal Section specifications, carried in our stock at all times. Other sizes and grades are in manufacturers' stock for prompt delivery.

Detailed specifications and prices furnished on request.

Chute Cable

No. 373 Chute Cable is specially designed for use in battery chutes and is extremely flexible and durable.

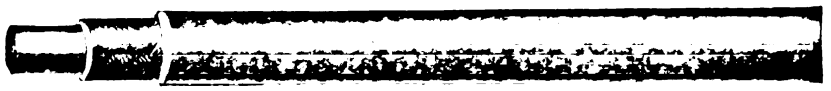
It is ideal for this purpose or for use wherever an extra flexible rubber covered and braided twisted pair is desired. Meets A. R. A. Signal Section insulation specifications. Carried in stock for prompt delivery.

Digitized by Google

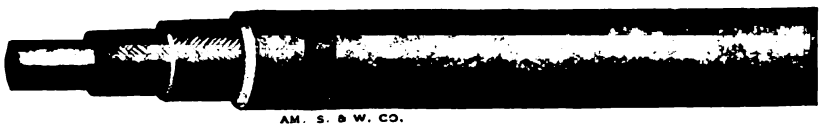
Weatherproof Line Wire

Double Braid **Triple Braid**

National Electrical Code Standard



Double Braid



Triple Braid

There is a large demand for electrical wires and cables having a moderate degree of insulation and less expensive than rubber insulated conductors. For outdoor service double and triple braid Reliance Weatherproof wire meets these requirements in every particular. These wires and cables are made in strict accordance with all the requirements of the National Board of Fire Underwriters, the sizes varying from No. 18 B. & S. to the largest feeder cable used.

The wires are first covered with two or three evenly woven braids of strong fibrous material, after which they are placed in a hot bath of weatherproof insulating compound. They remain in this bath long enough to completely and thoroughly saturate the fibrous insulation. After thoroughly drying, the wire then receives a dressing of mineral wax, after which the surface is thoroughly burnished and polished, reducing to a minimum trouble from sleet and ice. The superior grade of compounds used in Reliance Weatherproof insulation for wires and cables imparts a high degree of dielectric strength, and overcomes the destructive action of the elements. This insulation is firm, durable and tough and possesses great mechanical strength, which enables it to withstand pressure and mechanical abrasion. The compounds contain no solvents which subsequently evaporate, leaving the compound to dry and fall out, thus destroying the insulation. They will withstand all ordinary climatic conditions.

Detailed specifications and prices furnished on request.

SLOW BURNING WIRES

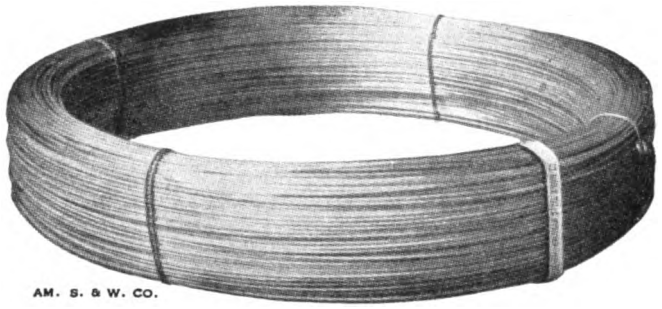
This, as its name implies, has an insulation that will not carry flame. It is especially useful in hot dry places where ordinary insulations would perish, and where wires are brought together, as on the back of a large switchboard or in a wire tower, where the accumulation of rubber or weatherproof insulations would result in an objectionably large mass of highly inflammable material.

This wire is made in strict accordance with the requirements of the National Board of Fire Underwriters in all respects. Each insulating braid is completely saturated with white slow burning compound, and the outside is thoroughly slicked down and given a hard, smooth, white surface.

Detailed specifications and prices furnished on request.

Digitized by Google

Double Galvanized Iron Line Wire



There are three standards of extra galvanized Line Wire as follows:

"Extra Best Best" (E.B.B.) stands highest in conductivity of any telegraph wire with a weight per mile ohm of from 4700 to 5000 pounds.

"Best Best" (B.B.) superior to E.B.B. in mechanical qualities and equal in galvanizing but of somewhat lower electrical value. Weight per mile ohm 5600 to 6000 pounds.

"Steel," more expressly designed for short line service when a measure of conductivity can be exchanged for high tensile strength in a light line. Weight per mile ohm 6500 to 7000 pounds.

While these three grades differ in physical characteristics, there is no difference in galvanizing, which is of the highest commercial standard.

We carry a stock at all times of No. 8 B.W.G. E.B.B. wire in one-half (½) mile coils and can furnish promptly wire of specified grade in sizes No. 4 to No. 14 B.W.G.

We can furnish tie wires of any size of wire cut to specified length in bundles of 100 or 200 wires each.

Resistance and Weights of Telegraph and Telephone Wires

Averages of a large number of tests.

Birmingham Wire Gauge	Diameter in Inches	Weight in Pounds Per 1,000 Feet	Weight in Pounds Per Mile	In Bundles (Miles)	Approximate Breaking Strain (Pounds)			Average Resistance Per Mile at 68° F (International Ohms)		
					E. B. B.	B. B.	Steel	E. B. B.	B. B.	Steel
4	.238	153	811	¼	2,028	2,271	2,433	5.98	7.15	8.32
6	.203	112	590	⅓	1,475	1,652	1,770	8.22	9.83	11.44
8	.165	74	390	½	975	1,092	1,170	12.43	14.87	17.31
9	.148	60	314	½	785	879	942	15.44	18.47	21.50
10	.134	49	258	½	645	722	774	18.79	22.48	26.16
11	.120	39	206	½	515	577	618	23.54	28.16	32.77
12	.109	32	170	½	425	476	510	28.52	34.12	39.71
14	.083	19	99	½	247	277	297	48.98	58.59	68.18

Digitized by Google

Bond Wires

COPPER

GALVANIZED IRON AND COPPER CLAD

Cut any length from No. 8 BWG EBB Galvanized Iron Wire or from No. 6 B. & S. (which equals No. 8 BWG) Copper or Copper Clad Material. Put up in bundles of 200 wires each.

BOND WIRE TABLES

No. 8 BWG. EBB Galvanized Iron Bond Wires

	Length	Approximate Weight per 1000	Approximate Wires per Cwt.
No. 1400	40 inches	250 lbs.	400
No. 1401	42 inches	261 lbs.	380
No. 1402	44 inches	275 lbs.	364
No. 1403	46 inches	286 lbs.	345
No. 1404	48 inches	300 lbs.	333
No. 1405	50 inches	310 lbs.	318
No. 1406	52 inches	324 lbs.	306
No. 1407	54 inches	337 lbs.	295
No. 1408	56 inches	348 lbs.	284
No. 1409	58 inches	360 lbs.	275
No. 1410	60 inches	375 lbs.	268
No. 1411	62 inches	386 lbs.	257
No. 1412	64 inches	395 lbs.	248
No. 1413	66 inches	410 lbs.	241
No. 1414	68 inches	423 lbs.	234
No. 1415	70 inches	435 lbs.	229
No. 1416	72 inches	450 lbs.	222

No. 6 B. & S. Gauge, Copper Clad Bond Wires

No. 1518	42 inches	268 lbs.	372
No. 1519	44 inches	281 lbs.	354
No. 1520	48 inches	306 lbs.	325
No. 1521	52 inches	344 lbs.	300
No. 1522	54 inches	372 lbs.	290
No. 1523	60 inches	383 lbs.	260

No. 6 B. & S. Gauge, Solid Copper Bond Wires

No. 1624	42 inches	275 lbs.	361
No. 1625	44 inches	287 lbs.	343
No. 1626	48 inches	315 lbs.	315
No. 1627	52 inches	341 lbs.	290
No. 1628	54 inches	355 lbs.	280
No. 1629	60 inches	393 lbs.	251

See page 208 for table showing quantities required.

Wires of special lengths cut to order.

Digitized by Google

ARMCO IRON

Bond Wires—Line Wires

No. 8 BWG

ARMCO IRON WIRE has the best rust-resisting features and the highest electrical conductivity known to iron or steel products, and being extremely uniform in both chemical and physical structure has no weak spots or localized impurities where pitting may occur and ultimately cause breakage or reduced electrical conductivity.

ARMCO IRON BOND WIRES meet all requirements of the A. R. A. They are furnished in the usual lengths or will be cut to any special lengths required. They are made of the purest commercial iron manufactured, guaranteed to contain not less than 99.84 per cent pure iron, surpassing in this respect Swedish and Norway brands or nearly pure irons.

Bond wires are double galvanized, but their unusual resistance to corrosion is not due to the surface treatment alone. Their purity and uniformity, as shown by the analysis, make them rust-resisting through and through.

ARMCO IRON LINE WIRE, the same product, cannot be equaled in conductivity, tensile strength, rust-resisting qualities or ease of handling by any other iron or steel wire.

Armco iron line wire is coiled in convenient ¼, ⅓, and ½ mile coils and is highly recommended for Signal, Telephone and Telegraph line wire.

All line wire is furnished in ½ mile coils unless otherwise specified.

ANALYSIS OF ARMCO IRON

Sulphur, Phosphorus, Carbon, Manganese, Silicon, Copper, Oxygen, Nitrogen, Hydrogen	16/100 of 1%
Iron	99 84/100%
Total	100%

See page 208 for table showing quantities required.

Digitized by Google

Channel Pins

FOR STEAM ROAD BONDING
Coppered or Tinned

Our Channel Pins are A. R. A. Signal Section Standard in every detail. Improved methods of manufacture as well as plating insure a product of the highest quality. Ample facilities enable us to deliver any quantity of pins on short notice, and our long experience in the manufacture of Channel Pins assures accuracy of cut as well as quality of plating, whether tinned or coppered.

No. 339
No. 340

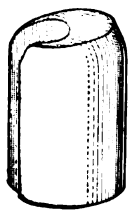
No. 342
No. 343

DESCRIPTION

No. 339. $\frac{9}{32}$"x1¼" A. R. A. Signal Section Standard Tinned Channel Pin.
No. 340. $\frac{9}{32}$"x1¼" A. R. A. Signal Section Standard Coppered Channel Pin.
No. 342. ⅜"x1¼" Standard Double Grooved Tinned Channel Pin.
No. 343. ⅜"x1¼" Standard Double Grooved Coppered Channel Pin.

See page 208 for table showing quantities required.

For Electric Road Bonding



		Gauge	Diameter of Pin	Hole in Rail
No. 1601.	Channel Pins for No.	-6 B. & S. wire.	$\frac{5}{16}$ in.	$\frac{9}{32}$ in.
No. 1602.	Channel Pins for No.	-4 B. & S. wire.	⅜ in.	$\frac{11}{32}$ in.
No. 1603.	Channel Pins for No.	-2 B. & S. wire.	$\frac{13}{32}$ in.	$\frac{7}{16}$ in.
No. 1604.	Channel Pins for No.	0 B. & S. wire.	$\frac{19}{32}$ in.	$\frac{9}{16}$ in.
No. 1605.	Channel Pins for No.	2-0 B. & S. wire.	$\frac{19}{32}$ in.	$\frac{9}{16}$ in.
No. 1606.	Channel Pins for No.	2-0 B. & S. wire.	$\frac{21}{32}$ in.	⅝ in.
No. 1607.	Channel Pins for No.	2-0 B. & S. wire.	¾ in.	$\frac{23}{32}$ in.
No. 1608.	Channel Pins for No.	4-0 B. & S. wire.	$\frac{25}{32}$ in.	¾ in.
No. 1609.	Channel Pins for No.	3-0 B. & S. wire.	¾ in.	$\frac{23}{32}$ in.
No. 1610.	Channel Pins for No.	4-0 B. & S. wire.	$\frac{29}{32}$ in.	⅞ in.

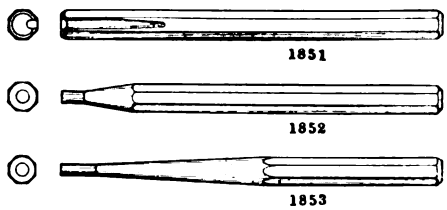
Digitized by Google

Channel Pin Punches and Sets

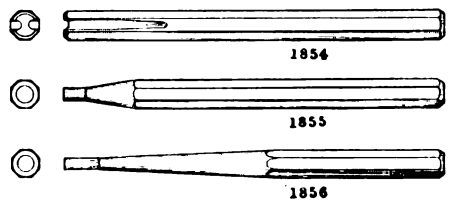
Our Channel Pin Punches and sets are made of the best quality tool steel, accurately machined and properly tempered to insure long life.

STANDARD SIZE

8 Inches Long



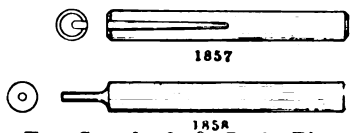
For Standard $\frac{9}{32}$ Inch Pins



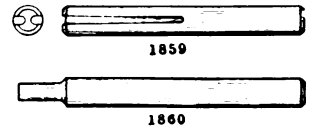
For Double Groove $\frac{3}{8}$ Inch Pins

INSPECTORS' POCKET SIZE

Sets 5 Inches Long. Punches 6 Inches Long



For Standard $\frac{9}{32}$ Inch Pins



For Double Groove $\frac{3}{8}$ Inch Pins

DESCRIPTION

No. 1851. Standard channel pin set for $\frac{9}{32}$ inch pins.

No. 1852. Standard channel pin punch for $\frac{9}{32}$ inch pins.

No. 1853. Standard channel pin drift punch for $\frac{9}{32}$ inch pins.

No. 1854. Standard channel pin set for $\frac{3}{8}$ inch double groove pins.

No. 1855. Standard channel pin punch for $\frac{3}{8}$ inch double groove pins.

No. 1856. Standard channel pin drift punch for $\frac{3}{8}$ inch double groove pins.

No. 1857. Pocket size channel pin set for $\frac{9}{32}$ inch pins.

No. 1858. Pocket size channel pin punch for $\frac{9}{32}$ inch pins.

No. 1859. Pocket size channel pin set for $\frac{3}{8}$ inch double groove pins.

No. 1860. Pocket size channel pin punch for $\frac{3}{8}$ inch double groove pins.

Digitized by Google

Flameweld Signal Bonds

Type F-1 **Type F-2**

STEEL OR COPPER TERMINALS

Flameweld Signal Bonds are advantageous where there is low ballast resistance, which cannot be easily remedied, as rail resistance is materially reduced by their use.

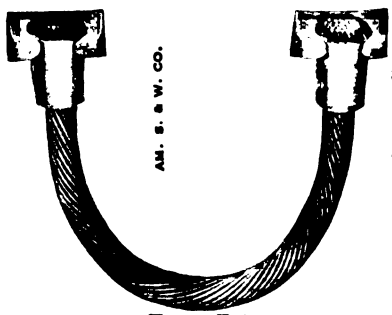
The bonds are applied to the head of the rail with the oxy-acetylene flame. A special copper alloy flux wire is used, which produces a tough and homogeneous attaching metal.

The terminals of the bonds are designed to meet the varying conditions peculiar to different rail joint designs.

The ends of the copper strand are left accessible for welding. The electrical connection is therefore through the weld and is not dependent upon the mechanical connection between the strand and the terminal.

The standard bonds are No. 2 B. & S. gauge, consisting of 37 wires, 7 inches long. The free length of the strand between terminals is approximately 5½ inches.

They are furnished in stub end, with terminal at one end only for bootleg or other wire to rail connections. Also furnished in varying lengths for special purposes.



Type F-1

The terminal of the F-1 bond makes a straight line contact with the rail over its whole width. This acts as a shelf to support and retain the molten attaching metal. The top of the terminal is beveled so that the angle of the bond can be varied and still leave the end of the copper strand accessible for welding.

Furnished with steel or copper terminals as specified.

Type F-2

The F-2 bond is especially designed for use on rail joints having widely projecting splice bars. Proper design of strand lay permits of normal expansion and contraction of the rail joint without distorting or "caging" the strand. Broken splice bars can be replaced without damaging the bonds.

Furnished with steel or copper terminals as specified.

See page 208 for table showing quantities required.

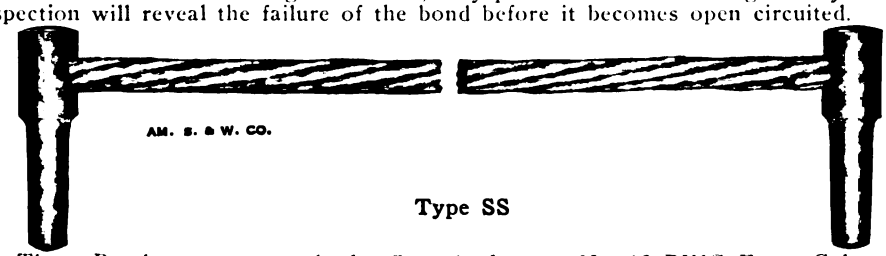
Digitized by Google

Stranded Signal Bonds

TERMINALS WELDED TO THE STRAND

This design of bond is decidedly superior to the old method of bonding with separate wires and channel pins, both mechanically and electrically. With the channel pin bonding there is a contact between the pin and the wire, a contact between the pin and the rail and a contact between the rail and the wire itself, the latter contact being along one side of the wire only. With the solid tapered stud of a manufactured bond there is but one contact between the pin and the rail, which is a decided advantage.

The advantages in favor of the manufactured bond are simplicity of installation, better mechanical performance, hence longer life, and improved electrical resistance. An important feature of the Stranded Bond is that it practically insures continuity of circuit. When the bonds begin to break, only part of the wires will give way so that inspection will reveal the failure of the bond before it becomes open circuited.



Type SS

These Bonds are composed of a Strand of seven No. 12 BWG Extra Galvanized Wires, with ⅜ inch diameter tapered steel terminals electrically welded thereto. The length of Bond is usually 20 inches greater than the length of the splice bar. The length may be varied at the discretion of the customer, depending upon the manner in which the Bond is to be applied. The standard length is 46 inches.

Type S-1

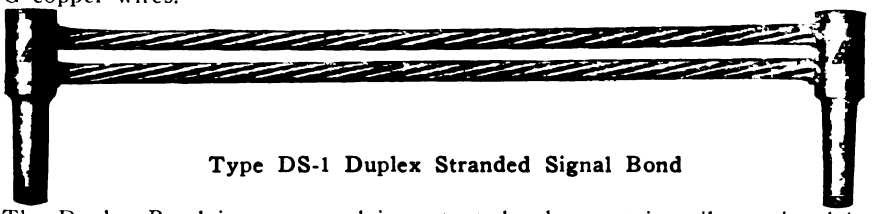
These Bonds are composed of 6 No. 12 BWG Extra Galvanized Wires and 1 No. 12 BWG Annealed Copper Wire in the center. Otherwise these Bonds are constructed the same as Type SS.

Type S-2

These Bonds are composed of 7 No. 10 AWG "Copperweld" Wires of 40% Conductivity.

Type S-3

These Bonds are composed of Annealed Copper Conductors, having 7 No. 10 AWG copper wires.



Type DS-1 Duplex Stranded Signal Bond

The Duplex Bond is a new and important development in railway signal bonds. It is practically two bonds in one. It has fourteen wires separated into two stranded conductors. Affords greater protection, increases flexibility and insures longer life. The increased flexibility permits the use of a shorter bond.

Type DS-1 consists of two strands of 6 galvanized steel wires and 1 center wire of annealed copper in each strand. All wires are No. 14½ BWG.

Bonds of special wire combinations furnished to specifications.

See page 208 for table showing quantities required.

Digitized by Google

No. 2 Drilling Machine

In Position for Work

Thrown Back to Detach from Rail

The No. 2 Drilling Machine is the most widely known and generally used of any machine for drilling bond wire holes for signal track circuits. It has been used with great satisfaction, by nearly every railroad in the country, for many years.

It is furnished for using $\frac{9}{32}$ inch or $\frac{3}{8}$ inch twist or flat bit as specified. It can be furnished with the well known set screw spindle or the improved high-duty spindle and chuck as specified. The set screw spindle for using $\frac{9}{32}$ inch twist bits will be furnished unless otherwise specified.

No. 2. Drilling Machine, with set screw spindle.
No. 2H. Drilling Machine, with Hyduty chuck and spindle.

Specify Size Bit to Be Used

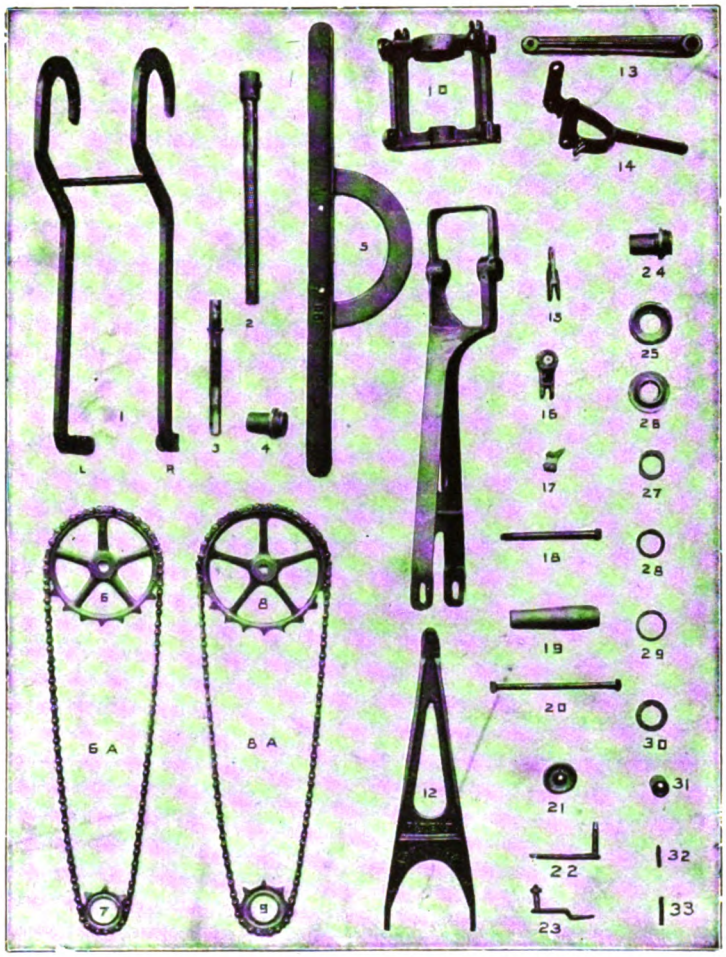
Bonding Drills

No. 1454

No. 1451. Carbon bonding drills $\frac{9}{32}$ inch, 3 inches long.
No. 1452. High speed bonding drills $\frac{9}{32}$ inch, 3 inches long.
No. 1454. High speed bonding drills $\frac{3}{8}$ inch, 3 inches long, $\frac{9}{32}$ inch shank.
No. 1455. High speed bonding drills $\frac{3}{8}$ inch, 3 inches long, $\frac{3}{8}$ inch shank.

Digitized by Google

Repair Parts for No. 2 Drilling Machine



No.	Description
1.	Rail hooks.
2.	Spindle.
3.	Crank shaft.
4.	Drive sleeve.
5.	Foot plate.
6.	Feed sprocket, 19 teeth.
6A.	Feed chain, 47 links.
7.	Feed nut sprocket, 7 teeth.
8.	Drive sprocket, 21 teeth.
8A.	Drive chain, 48 links.
9.	Drive sleeve sprocket, 8 teeth.
10.	Sliding frame.
11.	Upright frame.
12.	Upright frame brace.
13.	Crank.
14.	Toggle lever.
15.	Toggle 2.
16.	Arm.
17.	Pawl.

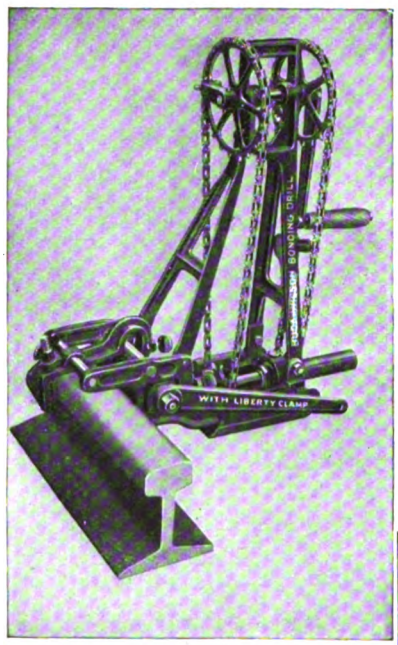
No.	Description
18.	Bolt for handle, specify ⅜″ or $\frac{7}{16}$″ diameter.
19.	Wood handle.
20.	Toggle lever bolt.
21.	Idler wheel.
22.	Idler adjusting plate.
23.	Idler bracket.
24.	Feed nut.
25.	Cup for ball bearing.
26.	Cone for ball bearing.
27.	Adjusting nut.
28.	Washer for adjusting nut.
29.	Lock nut.
30.	Collar for drive sleeve.
31.	Bushing for crank shaft 2.
32.	Pawl spring and pin.
33.	Crank shaft pins.
34.	Brass bushing for No. 10 sliding frame.
36.	¼″ steel balls (set of 20).

Digitized by Google

B. W. Drilling Machine

WITH LIBERTY CLAMP

Clamps to All Sizes of Rail
Drills in Any Position of Rail
For $\frac{9}{32}$ Inch or $\frac{3}{8}$ Inch Twist or Flat Bits

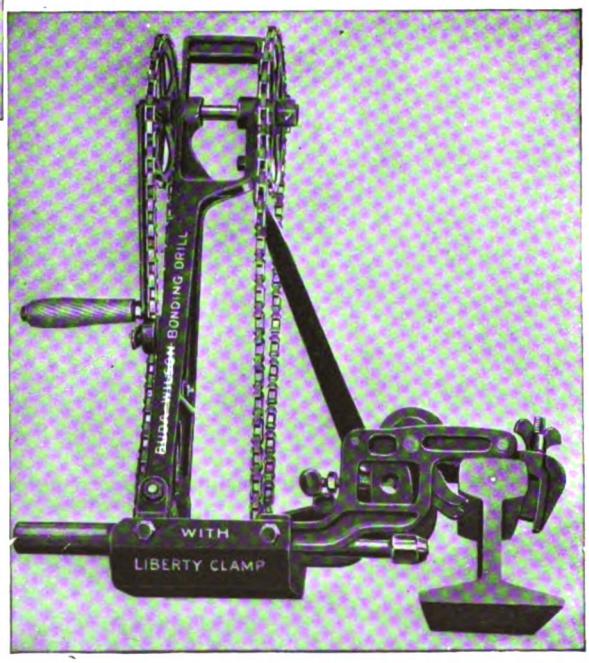


The B. W. Drilling Machine is of the rail clamp type, which has no foot plate, but clamps rigidly to the rail. The rail hooks are provided with adjustable features to take care of different sizes of rail heads. The rail clamps are adjustable for different rails, and clamping, as they do, under the head of the rail, hold the drill rigidly and firmly, regardless of any rail wear. This adjustment of both hooks and clamps is arranged for by thumb screws, being very simple and quickly accomplished.

There are two points of contact of the clamps to the rail, the clamps being operated by two cams by means of a hand lever on the left side of the drill. When necessary to detach the drill from the rail, it is quickly done by simply throwing over the hand lever releasing the cams.

This drill has the original feature of the No. 2 Drilling Machine for advancing the bit to and returning it from the rail by disengaging the drive sprocket. A slide arrangement with set screw adjusts an idler for tightening feed chain.

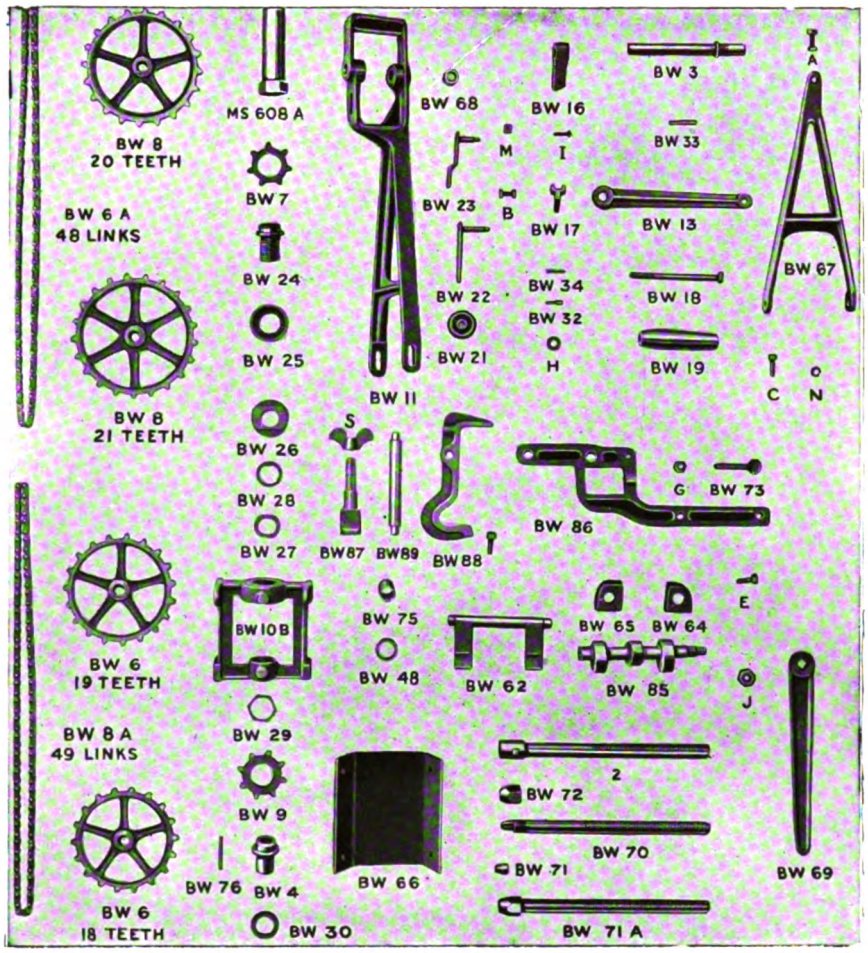
"Hyduty" chuck for $\frac{9}{32}$" twist bit will be furnished unless otherwise specified.



Specify Size of Bit to Be Used

Digitized by Google

Repair Parts for B. W. Drilling Machine



No.	Description
BW-2.	Spindle with set screw for 9/32" shank twist bit.
BW-2A.	Spindle with set screw for ⅜" shank twist bit.
BW-3.	Crank shaft.
BW-4.	Drive sleeve.
BW-6.	Feed sprocket (19 teeth).
BW-6A.	Feed chain (48 links).
BW-7.	Feed nut sprocket (7 teeth).
BW-8.	Drive sprocket (21 teeth).
BW-8A.	Drive chain (49 links).
BW-9.	Drive sleeve sprocket (8 teeth).
BW-10B.	Lower frame.
BW-11.	Upright frame.
BW-13.	Crank.
BW-16.	Pawl arm.
BW-17.	Pawl.
BW-18.	Crank handle bolt.
BW-19.	Crank handle.
BW-21.	Idler wheel.
BW-22.	Idler brace.
BW-22A.	Idler frame brace pin.
BW-23.	Idler bracket and shaft.
BW-24.	Feed nut.
BW-25.	Ball bearing cup.
BW-26.	Ball bearing cone.
BW-27.	Adjusting nut.
BW-28.	Adjusting nut washer.
BW-29.	Lock nut.
BW-30.	Drive sleeve collar.
BW-32.	Pawl plunger.
BW-33.	Crank shaft pins.
BW-34.	Pawl plunger spring.
BW-48.	Drive sleeve.
BW-62.	Clamping dog.
BW-64.	Clamping eccentric block (R. H.).

No.	Description
BW-65.	Clamping eccentric block (L. H.).
BW-66.	Shield.
BW-67.	Upright frame base.
BW-68.	Crank shaft bushing.
BW-69.	Clamping lever.
BW-70.	Spindle.
BW-71.	Chuck jaw.
BW-71A.	Chuck and spindle combined.
BW-72.	Chuck.
BW-73.	Eccentric adjusting screw.
BW-75.	Feed screw tube.
BW-76.	Drive sleeve key.
BW-85.	Clamping dog eccentric.
BW-86.	Side frame.
BW-87.	Clamping block.
BW-88.	Clamping hook.
BW-89.	Clamping hook shaft.
MS-608A.	Feed screw shield.

A. Upright frame and brace and frame hex. head machine bolts with hex. nuts (3) $\frac{5}{16}$"x1".
B. Idler frame hex. head machine bolts with hex. nuts ¼"x¾".
C. Side frame and brace hex. head cap screws.
D. Side frame and adjusting dog hex. head cap screws.
E. Side frame and lower frame hex. head cap screws.
G. Eccentric thumb screw and handle bolt hex. half nuts.
H. Washers for upright frame and lower frame and right frame and brace.
I. Pawl arm rivets.
J. Eccentric and clamping lever hex. nuts.
M. Square nut for idler brace shaft.
S. Clamping block wing nut.

Digitized by Google

"Hyduty" Paulus Track Drill

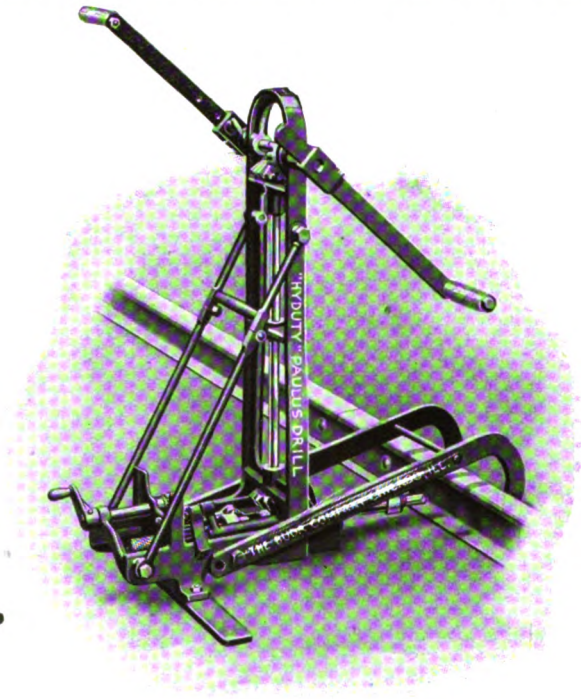
FOUR STYLES OF HOOKS WHICH ARE INTERCHANGEABLE

The bit is advanced to and returned from the rail quickly by means of the small crank shown at the back of the frame.

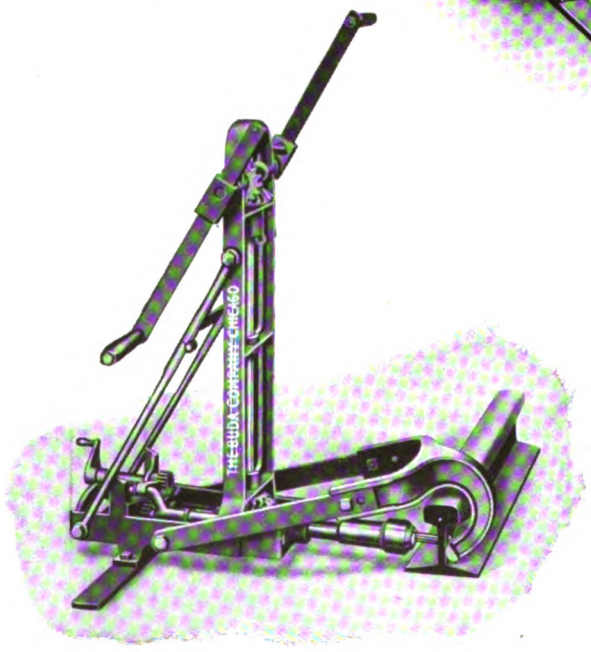
The Type A has the double overclutch that has long been the standard, and is, therefore, familiar to all users.

The type B, which has the single overclutch, has two advantages. The hook can be lengthened for use in drilling through both rail and fish plate, angle bars, frogs, etc., and permits drilling holes close to end of rails.

The Type C (not illustrated) has the underclutch, often an advantage, and the Type D (also not shown) has an extra high, adjustable, overclutch for use in drilling high Tee rails, I beams, etc.



Type A



Type B

The best material and workmanship enter into the manufacture of these drills.

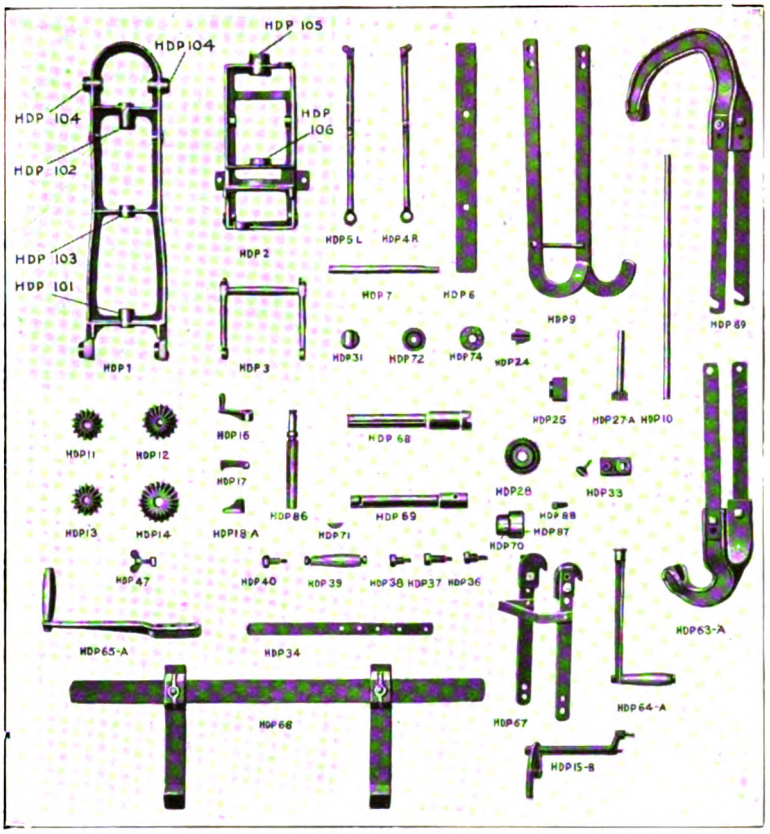
The special ball thrust bearings used make an easy running drill, ideal for all classes of rail drilling.

The highly recommended Celfor-Rich spindle and flat bit are shown in the illustration. However, the standard spindle, with set screw, for using twist bits is furnished, unless otherwise specified.

When ordering, specify type and style of spindle required.

Digitized by Google

Repair Parts for "Hyduty" Paulus Track Drill



No.	Description
HDP-1.	Upper frame.
HDP-2.	Lower frame.
HDP-3.	Upper backbone brace.
HDP-4R.	Lower backbone brace.
HDP-5L.	Lower backbone brace.
HDP-6.	Foot plate.
HDP-7.	Crank shaft.
HDP-9.	Rail hook, complete.
HDP-10.	Vertical shaft.
HDP-11.	Upper gear, crank shaft.
HDP-12.	Upper gear, vertical.
HDP-13.	Lower vertical shaft gear.
HDP-14.	Lower eccentric gear.
HDP-15B.	Rocker shaft, new style.
HDP-16.	Quick return handle.
HDP-17.	Ratchet feed dog.
HDP-18A.	Pawl shield.
HDP-24.	Jaw for Rich chuck.
HDP-25.	Sleeve for Rich chuck.
HDP-27A.	Quick return pinion and shaft.
HDP-28.	Ratchet wheel.
HDP-29.	Key for eccentric gear.
HDP-30.	Key for feed screw.
HDP-31.	Rich thrust block.
HDP-32.	Cam roller.
HDP-33.	Crank hub and thumb screw.
HDP-34.	Crank bar, adjustable.
HDP-36.	Screw for back brace.
HDP-37.	Screw for back brace to boxes.
HDP-38.	Screw for upper box to hooks.
HDP-39.	Crank handle, bolt and nut.
HDP-40.	Screw for rocker arm.
HDP-47.	Wing nut.
HDP-55.	Pawl pin.
HDP-56.	Rocker shaft pin.
HDP-57.	Under clutch eye bar.
HDP-58R.	Under clutch hook.
HDP-59.	Hook brace.
HDP-60.	Under clutch cross bar.
HDP-61.	Hook bar.

No.	Description
HDP-62.	Over clutch link.
HDP-63.	Rail hooks.
HDP-63A.	Over clutch hook and links, complete.
HDP-64A.	Crank, complete.
HDP-65.	Crank, variable throw.
HDP-65A.	Crank, variable throw, complete.
HDP-66.	Under clutch rail hook and cross bar, complete.
HDP-67.	Under clutch rail hook, complete.
HDP-68.	Rich spindle, complete.
HDP-69.	Standard spindle, complete with set screw.
HDP-69A.	"Hyduty" spindle, complete.
HDP-69B.	Clamping sleeve for "Hyduty" spindle.
HDP-69C.	Clamping block for "Hyduty" spindle.
HDP-70.	Screw for ball bearing, thrust shield.
HDP-71.	Spindle retaining key.
HDP-72.	Thrust ball races.
HDP-73.	3/8" steel ball.
HDP-74.	Ball retainer with 9 balls.
HDP-77.	Crank shaft key, No. 21 Whitney.
HDP-78.	Pawl shield bolt.
HDP-79.	Ball oiler.
HDP-83.	Key for vertical gears.
HDP-84.	Crank pin.
HDP-85.	Ball thrust bearing, complete, 72, 74.
HDP-86.	Feed screw.
HDP-87.	Ball bearing thrust shield.
HDP-88.	Set screw for standard spindle.
HDP-89.	Girder rail hook and connecting links, complete.
HDP-101.	Bushing for frame.
HDP-102.	Bushing for frame.
HDP-103.	Bushing for frame.
HDP-104.	Bushing for frame.
HDP-105.	Bushing for frame.
HDP-106.	Bushing for frame.

NOTE—In ordering bushings, refer to diagram and give symbol number corresponding to exact bushing to be replaced, as each bushing is different in size.

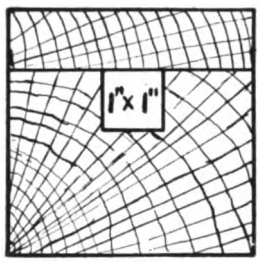
Digitized by Google

Wood Trunking

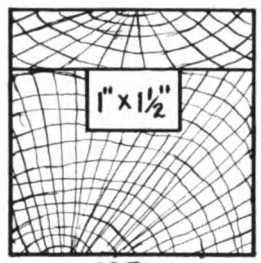
Trunking, 3"x4" **Capping, 1"x4"**

Grooves as Shown

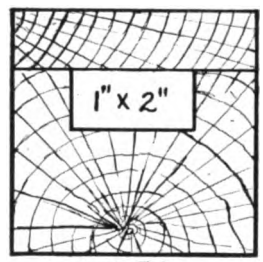
Selected First Grade Norway Pine—Dressed



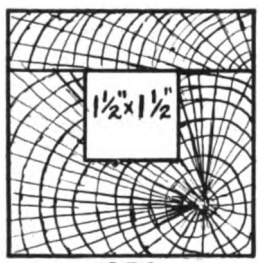
1850



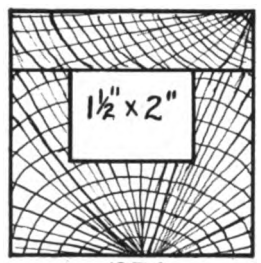
1851



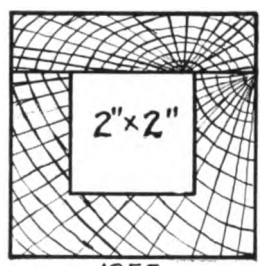
1852



1853



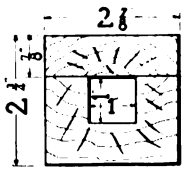
1854



1855

DESCRIPTION

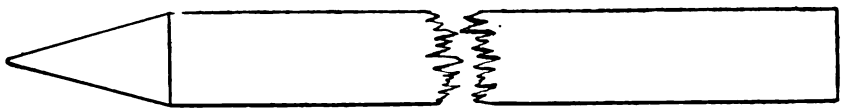
No. 315. Trunking, 1⅞x2⅞ in. Capping ⅞x2⅞ in. Groove, 1x1 in.
No. 1850. Trunking, 3x4 in. Capping, 1x4 in. Groove, 1 x1 in.
No. 1851. Trunking, 3x4 in. Capping, 1x4 in. Groove, 1 x1½ in.
No. 1852. Trunking, 3x4 in. Capping, 1x4 in. Groove, 1 x2 in.
No. 1853. Trunking, 3x4 in. Capping, 1x4 in. Groove, 1½x1½ in.
No. 1854. Trunking, 3x4 in. Capping, 1x4 in. Groove, 1½x2 in.
No. 1855. Trunking, 3x4 in. Capping, 1x4 in. Groove, 2 x2 in.



315

Other Sizes to Specifications

Wood Trunking Stakes



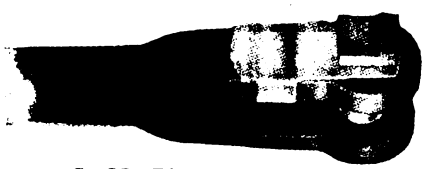
DESCRIPTION

No. 1832. Trunking Stakes, 4x4 in. x 3 ft. 6 in.
No. 1833. Trunking Stakes, 4x4 in. x 4 ft. 6 in.
No. 1834. Trunking Stakes, 4x4 in. x 3 ft.
No. 1835. Trunking Stakes, 4x4 in. x 4 ft.

Digitized by Google

The S. M. Pin Locks and Bushings

The continued wear and consequent lost motion which takes place in the connections of jaws to cranks, compensators, deflecting bars, etc., is an extremely important factor in the cost of maintenance of interlockings, switches, derails and similar apparatus.



S. M. Pin-Lock Applied

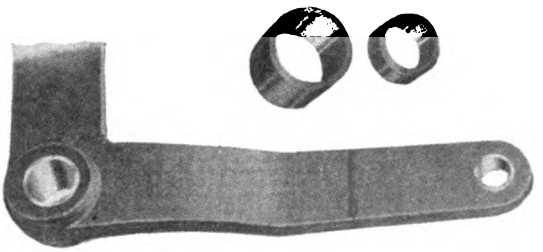
The S. M. Pin-Locks and Crank Bushings reduce this wear and eliminate the necessity of re-forging and re-drilling of the cranks and jaws and the enormous waste caused by the discarding of material when the pin holes have become worn.

The S. M. Pin-Lock is a sheet metal punching for fastening to the jaw to prevent the turning of the pin. By bending one of the lips up over the square head of the pin and the other two lips down over the jaw, the pin is securely locked against turning in the jaw, thus eliminating all wear from the jaw and forcing all motion to the bearing of the pin in the crank.

By the use of Bronze Bushings in the cranks wear may also be eliminated from the crank, placing all the wear on the bushing and pin; preserving the jaw and crank indefinitely.

Bronze bushings are supplied for both the 7/8" and 1¼" bearings of cranks, deflecting bars, etc.

These bushings should be pressed in with an ordinary machinist's bench vise after the holes have been drilled and reamed to the outside diameter of the bushings.

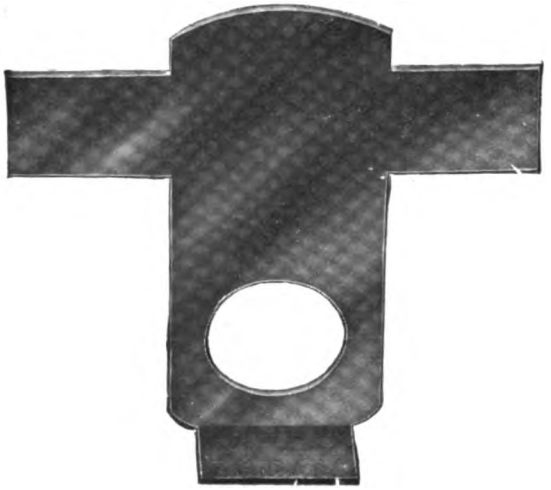


Bronze Bushings and the Way They Are Applied

The inside diameter of Bronze bushings can be reamed to size should they become distorted when being pressed into the crank. Because of this, Bronze bushings are more adaptable to application in the field than are Hardened Steel Bushings.

The small cost of the Pin Locks, Bushings and Pins as compared with the cost of re-forging and re-drilling, or of a new crank and jaws is well worth consideration.

It will be seen that all jaws and cranks equipped with the S. M. Pin-Lock and Bronze Bushings are practically permanent in service and that therefore their use is in the interest of economy, even though the Hardened Steel Pin is not used.



Patent Applied For

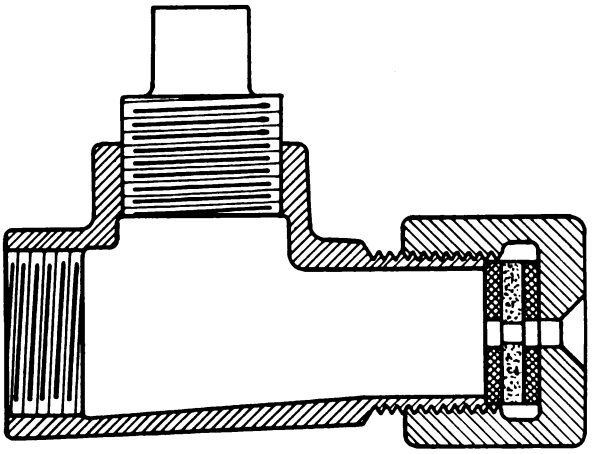
No. 1097. S. M. Pin-Lock for 7/8 inch pins.
No. 1098. 7/8 inch I.D. Bronze Bushing.
No. 1099. 1¼ inch I.D. Bronze Bushing.

Digitized by Google

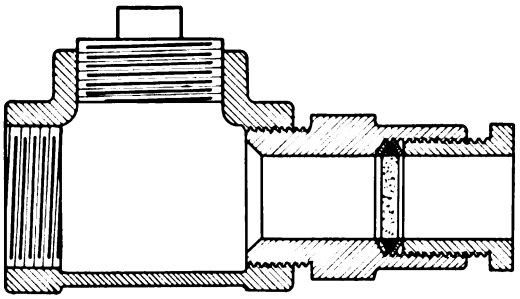
Stuffing Boxes

A. R. A. SPECIFICATIONS

For Wire Lines **For Pipe Lines**



No. 90. For Wire Line



No. 94. For Pipe Line

DESCRIPTION

No. 90. Stuffing box and oil inlet, A. R. A. drawing No. 1226.

No. 94. Stuffing box and oil inlet, A. R. A. drawing No. 1225.

No. 95. Standard one inch plunger, with two tang ends.

No. 96. Standard one inch plunger, with tang and threaded end.

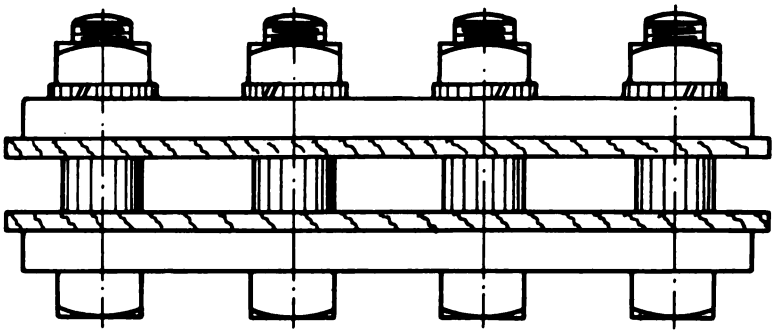
No. 97. Standard one inch plunger, with tang and eye end.

Digitized by Google

Insulations

Switch Rod
A. R. A. Drawing 1055

Pipe Line
A. R. A. Drawing 1094



These insulations are made from the best grades of material obtainable insuring extra long life, thus infrequent renewals.

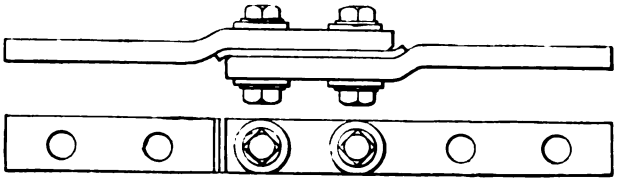
Switch Rod Insulations—Dwg. 1055

No. 10555. Switch rod insulation complete for 1 inch switch rod.
No. 10556. Switch rod insulation complete for ¾ inch switch rod.
No. 10551. Steel splice plate.
No. 10552. Fibre insulation plate.
No. 10553. Fibre insulation bushing for ¾ inch switch rod.
No. 10554. Fibre insulation bushing for 1 inch switch rod.
¾"x3" bolt and nut for ¾ inch switch rod.
¾"x1¼" bolt and nut for 1 inch switch rod.

Insulations for Standard 1 Inch Pipe Line—Dwg. 1094

No. 1094. Pipe line insulation complete.
No. 10946. Steel splice plate.
No. 10947. Fibre insulation plate.
No. 10948. Fibre insulation bushing.
⅝"x2½" bolt and nut.

Switch Rod Insulation, Style A



No. 360

No. 360. Style A—Insulated switch rod section for bolting.

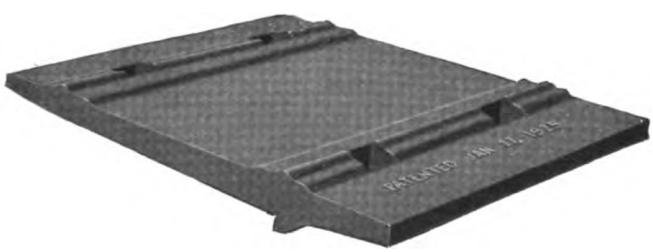
We are prepared to make up insulated switch rod sections to railroad companies' standards.

Digitized by Google

Tie Plates

Recessed End Compression Bottom

The Railroad Supply Company tie plates, for both light and heavy traffic, are made in a great many different types adapted to every class of track. They are rolled from new steel billets or from special alloy steel, having high resistance to corrosion, thereby insuring long service life. The wide variety of designs supply types adapted to every class of track construction and to all kinds of service.



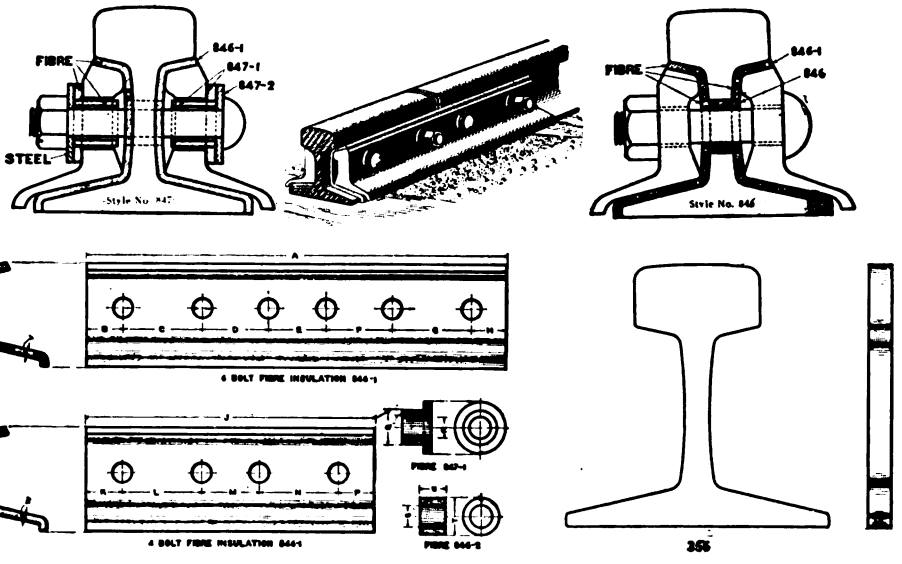
Recessed End Cutaway Bottom

Our Recessed End Compression Bottom, Recessed and Cutaway Bottom, Compression Bottom and Undulated Bottom types are our specialties. All of these types may be had with a canted or flat top, with or without camber, and with other essential details of design made to meet rigid requirements.

Digitized by Google

Insulated Rail Joints and Fibre Insulation

The No. 846 and No. 847 styles of Insulated Joints as shown are of the steel angle bar type. The steel parts are insulated from the rail by fibre angle bars with fibre bushings on the bolts. They differ from each other in the method of insulating the bolts. The No. 846 has the bolt insulated through the rail, while the No. 847 has the bolt insulation in the angle bars. They are easily installed and make very strong and durable insulations.



No.	Description	No.	Description
846.	Insulated joint, complete. (Specify size and drilling of rail.)	846-3.	Bolt and nut. (Specify size.)
847.	Insulated joint, complete. (Specify size and drilling of rail.)	847-1.	Fibre bolt bushing and washer for angle bar. (Specify size.)
846-1.	Fibre angle bars for 846 and 847. (Specify size and drilling.)	847-2.	Wrought iron washer for 847-1. (Specify size.)
846-2.	Fibre bolt bushing for rail. (Specify size.)	847-3.	Steel angle bars for 846 and 847 joints. (Specify size and drilling.)
		356.	Fibre end post, ¼" thick. (Specify rail section.)

NOTE—We carry in stock and are prepared to furnish fibre sheet, rods, tubing or special shapes, and solicit the opportunity to quote on requirements.

Digitized by Google

Continuous Insulated Rail Joint

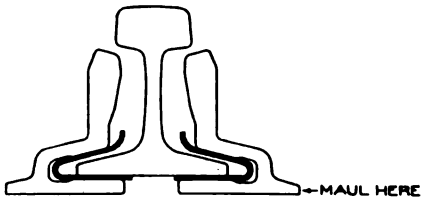
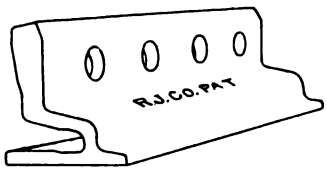


FIGURE 1



METAL JOINT BAR

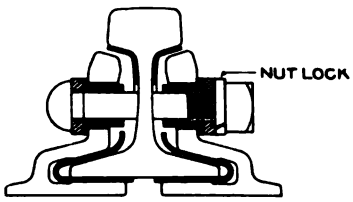
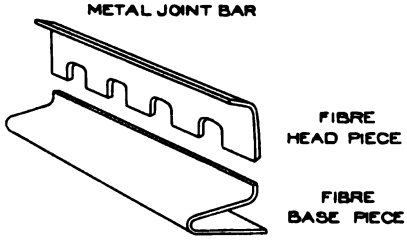


FIGURE 2



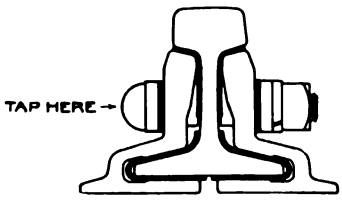
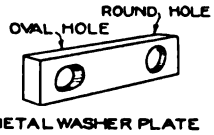


FIGURE 3

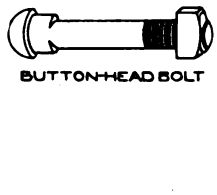


METAL WASHER PLATE

FIBRE WASHER PLATE

FIBRE BUSHING

NUT LOCK

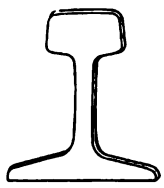


BUTTONHEAD BOLT

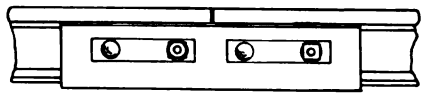
—NOTE—

IN ORDERING REPAIR PARTS, IF DRAWING NUMBERS CANNOT BE SPECIFIED, GIVE THE FOLLOWING DETAILS:

FIBRE HEAD PIECE, FIBRE BASE PIECE, FIBRE WASHER PLATE	Specify Weight, Section and Drilling of Rail.
METAL WASHER PLATE	Specify Weight, Section, Drilling of Rail and Diam. of Bolt.
FIBRE END POST	Specify Weight and Section of Rail
FIBRE BUSHING	Specify Weight and Section of Rail and Diameter of Bolt
BOLT	Specify Weight and Section of Rail, and Diam. of Bolt.



FIBRE END POST



OUTSIDE VIEW OF JOINT

In ordering complete joints or parts, specify name and give weight, section and drilling of rail. This information is necessary to make prompt shipment. (See Note above.)

Digitized by Google

Weber Insulated Rail Joint

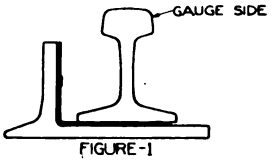


FIGURE-1

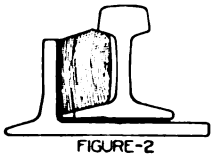


FIGURE-2

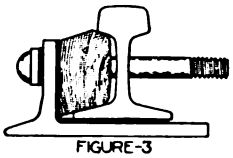


FIGURE-3

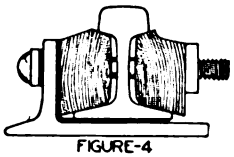


FIGURE-4

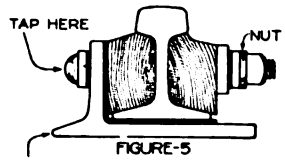
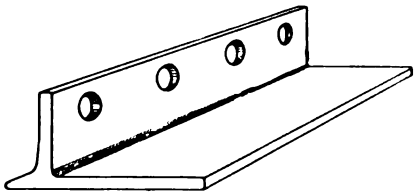
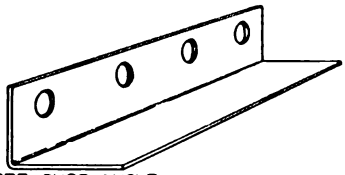
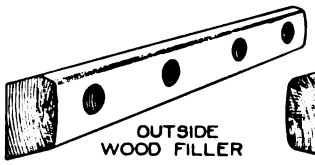
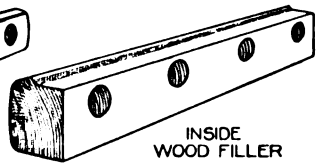


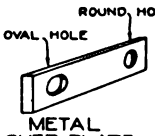
FIGURE-5


METAL SHOE ANGLE


FIBRE SHOE ANGLE

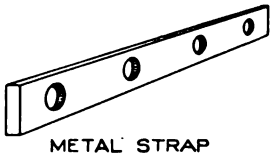

OUTSIDE WOOD FILLER


INSIDE WOOD FILLER



METAL WASHER PLATE

FIBRE WASHER PLATE


METAL STRAP

FIBRE BUSHING

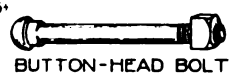
FIBRE END POST

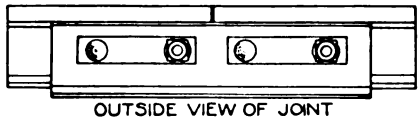
NUT LOCK

NOTE

IN ORDERING REPAIR PARTS, IF DRAWING NUMBERS CANNOT BE SPECIFIED, GIVE THE FOLLOWING DETAILS:

METAL SHOE ANGLE FIBRE SHOE ANGLE WOOD FILLERS (INSIDE, OUTSIDE OR PAIRS) METAL STRAP FIBRE WASHER PLATE	Specify Weight, Section and Drilling of Rail.
METAL WASHER PLATE	Specify Weight, Section and Drilling of Rail and Size of Bolt.
FIBRE END POST	Specify Weight & Section of Rail.
FIBRE BUSHING	Specify Weight & Section of Rail & Size of Bolt.
BOLT	Specify Weight & Section of Rail and Size of Bolt.

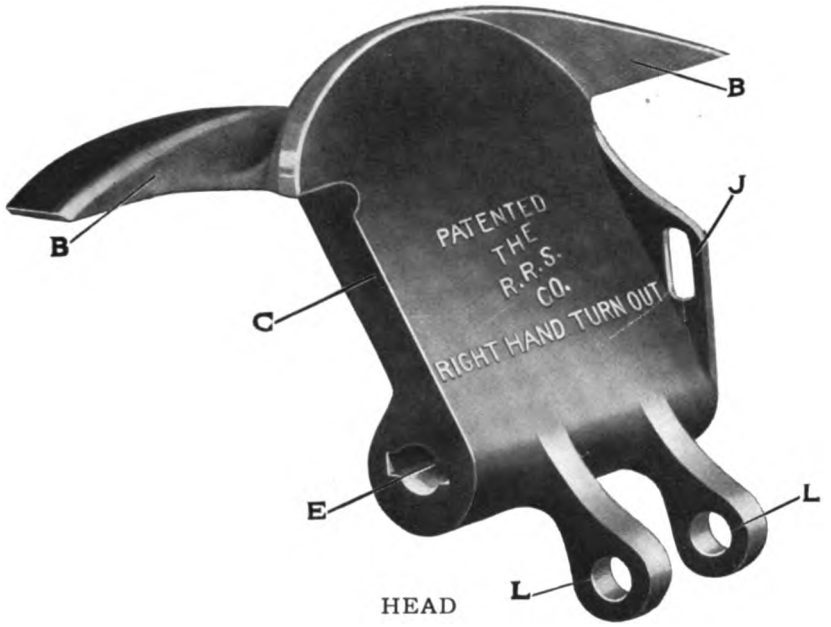

BUTTON-HEAD BOLT


OUTSIDE VIEW OF JOINT

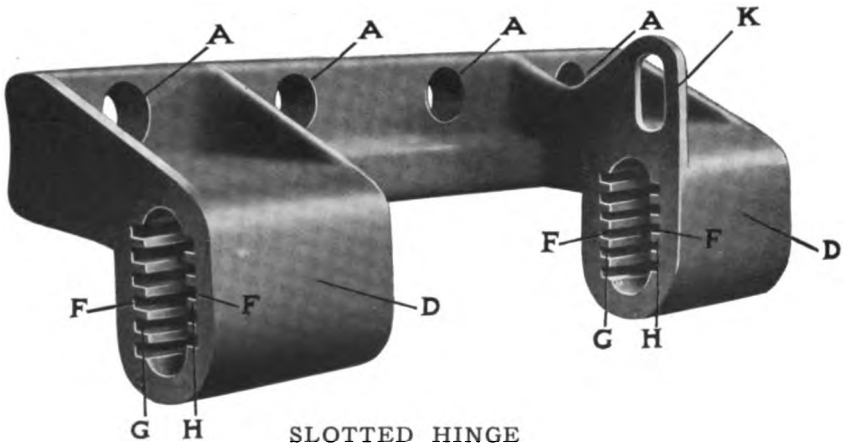
When ordering joints or parts, specify name and give weight, section and drilling of rail to facilitate prompt shipment. (See Note above.)

Digitized by Google

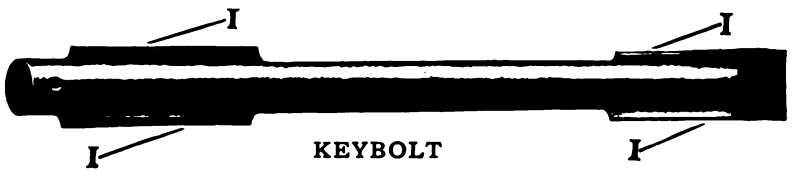
The "Chicago" Derailer



HEAD



SLOTTED HINGE



KEYBOLT

Digitized by Google

The "Chicago" Derailer

The Chicago Derailer is composed of three parts; the head, the slotted hinge, and the key bolt. To apply this derailer, fit the slotted hinge snugly against the inside of the web and flange of the outside rail, then drill four holes through the web of the rail to correspond with holes (A) in the slotted hinge and bolt the hinge to the rail, using standard 7/8x2½ inch machine bolts. Then place top (B) of derailer head on top of rail, the rotating arm (C) of the same fitting between the two ears (D) of the slotted hinge, the bolt hole (E) in the rotating arm (C) corresponding with a set of the key ways (F) in the slotted hinge.

The topmost slot on the left hand side (G) and the topmost slot on the right hand side (H) are designed to take the lugs (I) of the key bolt when used on rail with a height of 5¾ inches. The topmost slot on right hand side (H) is $\frac{3}{16}$ of an inch lower than the topmost slot on left hand side (G) and $\frac{3}{16}$ of an inch higher than the second slot of left hand side (G) and this staggered arrangement is carried down throughout the entire series.

With this arrangement a drop of $\frac{3}{16}$ of an inch can be made in the derailer head simply by applying the bolt from the right hand side when used with rail having a height of 5¾ inches, and applying from the left hand side with rail with a drop of another $\frac{3}{16}$ of an inch, and by continuing this process it will be seen that the same derailer can take care of any rail with a height of from 5¾ inches to 3⅞ inches.

With rails having heights between these $\frac{3}{16}$ inch variations the nearest set of slots should be used, as this small variation is taken care of by the play in the derailer. The locking device (J) on the derailer head corresponds to the locking device (K) on the slotted hinge when derailer is in position to protect main line and same can be locked in this position by means of an ordinary lock. The lugs (L) on derailer head are designed to take a standard screw jaw when derailer is connected with a hand throw switch stand or interlocking plant.

DESCRIPTION

No. RH.	Derail Complete for Left Hand Turnout.
No. LH.	Derail Complete for Right Hand Turnout.
No. RH-1.	Head only for Left Hand Turnout.
No. LH-1.	Head only for Right Hand Turnout.
	Hinge only.
	Keybolt only.

Digitized by Google

Bonding Data

The information given below will be found useful in determining requirements when laying new steel, rebonding track or bonding track for new signals. To the quantities given, add the equivalent of 15 joints for each switch and the equivalent of 35 joints for each cross over.

For 30 Foot Rail

Feet of Track	No. of Joints	Bond Wires Required	Single Groove Pins Required	Double Groove Pins Required	Manufactured Bonds Required
100	7	14	28	14	7
200	14	28	56	28	14
300	20	40	80	40	20
500	34	68	136	68	34
1000	67	134	268	134	67
1500	100	200	400	200	100
2000	134	268	536	268	134
½ mile	176	352	704	352	176
3000	200	400	800	400	200
4000	267	534	1068	534	267
5000	334	668	1336	668	334
1 mile	352	704	1408	704	352
6000	400	800	1600	800	400

For 33 Foot Rail

100	7	14	28	14	7
200	13	26	52	26	13
300	19	38	76	38	19
500	31	62	124	62	31
1000	61	124	248	124	61
1500	91	182	364	182	91
2000	122	244	488	244	122
½ mile	160	320	640	320	160
3000	182	364	728	364	182
4000	243	486	972	486	243
5000	304	608	1216	608	304
1 mile	320	640	1280	640	320
6000	364	728	1456	728	364

For 39 Foot Rail

100	6	12	24	12	6
200	11	22	44	22	11
300	16	32	64	32	16
500	26	52	104	52	26
1000	52	104	208	104	52
1500	77	154	308	154	77
2000	103	206	412	206	103
½ mile	136	272	544	272	136
3000	154	308	616	308	154
4000	206	412	824	412	206
5000	257	514	1028	514	257
1 mile	271	542	1084	542	271
6000	308	616	1232	616	308

Digitized by Google

Section 7

Contents

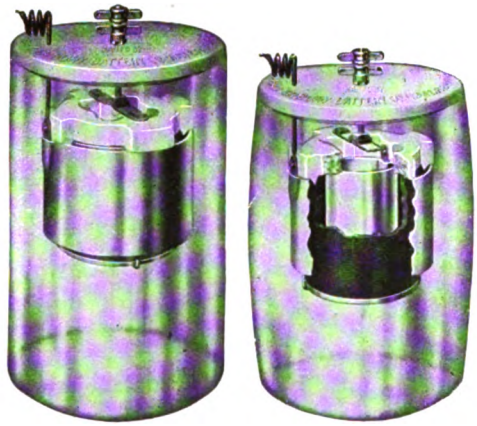
PRIMARY BATTERIES
GRAVITY BATTERIES
BATTERY ZINCS
BATTERY COPPERS
BATTERY JARS
BLUE VITRIOL
HYDROMETERS
BATTERY SUPPLIES
STORAGE BATTERIES

Digitized by Google

American Railway Association

PRIMARY BATTERIES AND RENEWALS

Unit Cylinder Type



No

29. Unit Cylinder Cell, complete with straight side heat resisting glass jar.
39. Unit Cylinder Cell, complete with barrel shaped heat resisting glass jar.
40. Complete Unit Cylinder Cell Renewal.
51. A. R. A. Porcelain Cover.

PLATE TYPE

No

25. A. R. A. Signal Cell, complete with straight side heat resisting glass jar, plain element.
26. A. R. A. Signal Cell, complete with straight side heat resisting glass jar, wire wound element.
35. A. R. A. Signal Cell, complete with barrel shaped heat resisting glass jar, plain element.
36. A. R. A. Signal Cell, complete with barrel shaped heat resisting glass jar, wire wound element.
37. Complete A. R. A. Renewal, plain element.
38. Complete A. R. A. Renewal, wire wound element.
51. A. R. A. Porcelain Covers.

GLASS JARS
HEAT RESISTING

		Outside Dimensions Diameter	Height
5.	Straight Side Heat Resisting Glass Jar.....	$6\frac{7}{16}$"	11"
6.	Barrel Shaped Heat Resisting Glass Jar.....	$6\frac{7}{16}$"	$9\frac{7}{8}$"

Digitized by Google

Complete Gravity Battery

No. 294. Gravity battery complete, consisting of:

1 No. 1 3-lb. 6x8 Crowfoot zinc.
1 No. 16 6x8 three leaf copper.
1 No. 33 6x8 glass jar.
3 lbs. Blue Vitriol per cell.

No. 295. Gravity battery complete, consisting of:

1 No. 4 1¾-lb. 5x7 Crowfoot zinc.
1 No. 16½ 5x7 three leaf copper.
1 No. 31 5x7 glass jar.
2 lbs. Blue Vitriol per cell.

Crowfoot Battery Zincs

Crowfoot zinc with brass binding post and screw connection.

No. 1. Plain, for 6x8-inch jar, weight 3 lbs.

No. 2. Plain, for 6x8-inch jar, weight, 2¾ lbs.

No. 2½. Plain, for 6x8-inch jar, weight 3¼ lbs.

No. 3. Plain, for 6x8-inch jar, weight 3½ lbs.

NOTE — Amalgamated Zincs furnished when specified.

Crowfoot zinc with brass binding post and screw connection.

No. 4. Plain, for 5x7-inch jar, weight 1¾ lbs.

NOTE — Amalgamated Zincs furnished when specified.

Digitized by Google

Circular Battery Zincs

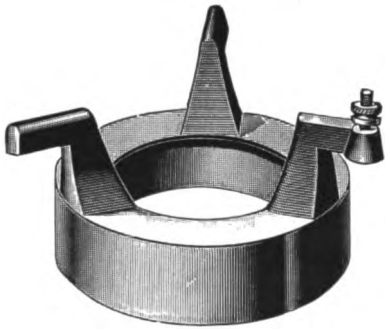
Round zinc with copper wire hangers and brass binding post with screw connection.

A. R. A. Signal Section Drawing No. 1087.

No. 6. Amalgam, for 6x8-inch jar, weight, 4 lbs.
No. 7. Amalgam, for 6x8-inch jar, weight, 3 lbs.
No. 6. Plain, for 6x8-inch jar, weight, 4 lbs.
No. 7. Plain, for 6x8-inch jar, weight, 3 lbs.

Round zinc with copper wire hangers. Double brass connector, furnished when specified.

No. 5. Amalgam, for 6x8-inch jar, weight, 4 lbs.
No. 8. Amalgam, for 6x8-inch jar, weight, 3 lbs.
No. 5. Plain, for 6x8-inch jar, weight, 4 lbs.
No. 8. Plain, for 6x8-inch jar, weight, 3 lbs.



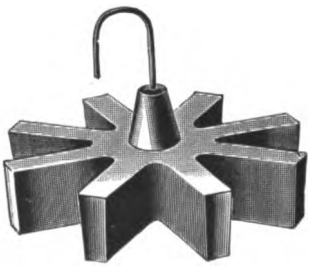
Round zinc (Gamewell Pattern), with brass dowel and thumb nut connection.

No. 66. Amalgam, for 6x8-inch jar, weight, 4 lbs.
No. 77. Amalgam, for 6x8-inch jar, weight, 3 lbs.
No. 66. Plain, for 6x8-inch jar, weight 4 lbs.
No. 77. Plain, for 6x8-inch jar, weight, 3 lbs.

Star Battery Zincs

Star zinc with copper wire connection.

No. 10. Plain, for 6x8-inch jar, weight, 3 lbs.
No. 10. Amalgam, for 6x8-inch jar, weight, 3 lbs.

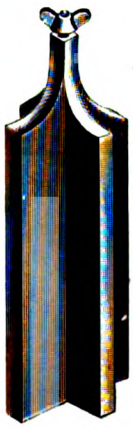


Digitized by Google

Battery Zincs

No. 2

No. 22



No. 12A

No. 14B

No. 15C

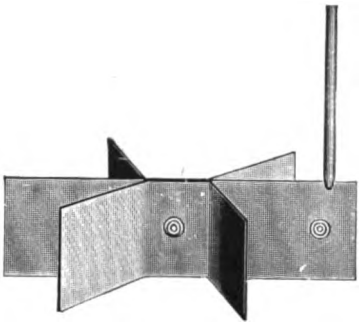
No. 11

2. Sampson zinc, plain, zinc knurled nut and washer connection.
11. Fuller zinc, plain, weight 1 lb., 3½ oz.
12A. Daniell zinc, plain, weight 2 lbs., brass knurled nut connection.
14B. Plain round rolled zinc.
15C. Plain square rolled zinc, milled 2½ inches from top.
22. Cylinder zinc, plain, brass knurled nut connection.

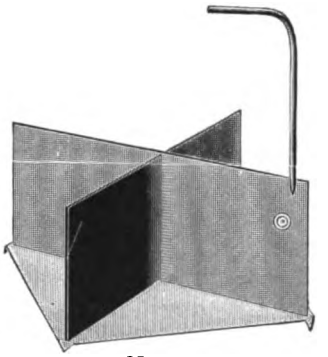
NOTE—Amalgamated zincs furnished when specified.

Digitized by Google

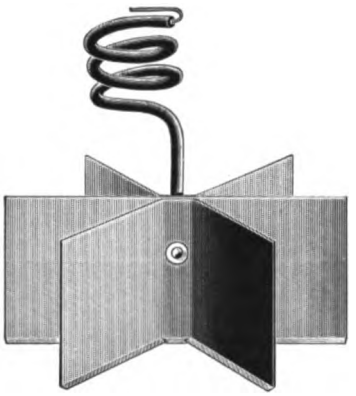
Battery Coppers



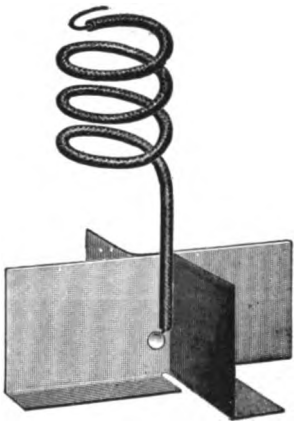
No. 16
No. 16½



No. 17



No. 18. Three-leaf A. R. A. Specifications, No. 10883, Drawing No. 1088



No. 19. Two-leaf A. R. A. Specifications, No. 10882, Drawing No. 1088

No. 16. Three-leaf Copper, size 2x6 inches, for 6x8-inch jar, connection 13 inches of No. 14 rubber covered wire.

No. 16½. Three-leaf Copper, size 2x5 inches, for 5x7-inch jar, connection 13 inches of No. 14 rubber covered wire.

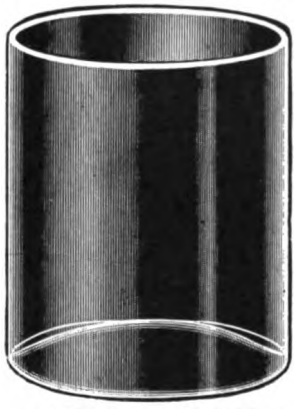
No. 17. Pan Bottom Copper, size 4¼x2½ inches, for 6x8-inch jar, connection 14 inches of No. 14 rubber covered braided wire.

No. 18. Three-leaf Copper. A. R. A. specification No. 10883, drawing No. 1088. Size, 2¼x5x¾-inch turnover, for 6x8-inch jar, connection 15 inches of No. 14 rubber covered wire.

No. 19. Two-leaf Copper. A. R. A. specification No. 10882, drawing No. 1088. Size, 2¼x5x¾-inch turnover, for 6x8-inch jar, connection 15 inches of No. 14 rubber covered wire.

Digitized by Google

Glass Battery Jars



GRAVITY BATTERY JARS
Packed 24 to a Crate

No. 31. Battery Jar, flint glass, size inside 5x7 inches.
No. 33. Battery Jar, flint glass, size inside 6x8 inches.

HEAT RESISTING GLASS JARS
A. R. A. Sig. Sec. Drawing No. 1053
Packed 16 to a Box

Jars cannot be cracked by the hot caustic solution because the glass is especially adapted to resist sudden changes in temperature. It is mechanically three times as strong as ordinary glass. Perfectly annealed under precise regulation of temperature to insure the elimination of any possible strain. Their use with potash batteries makes it possible to inspect the elements without disturbing them.

No. 3. Battery Jar, heat resisting, straight side, 6⅜x8½ inches, A. R. A. No. 10534.
No. 5. Battery Jar, heat resisting, straight side, $6\frac{7}{16}$x11 inches, A. R. A. No. 10533.
No. 6. Battery Jar, heat resisting, barrel shape, $6\frac{7}{16}$x9⅞ inches, A. R. A. No. 10532.

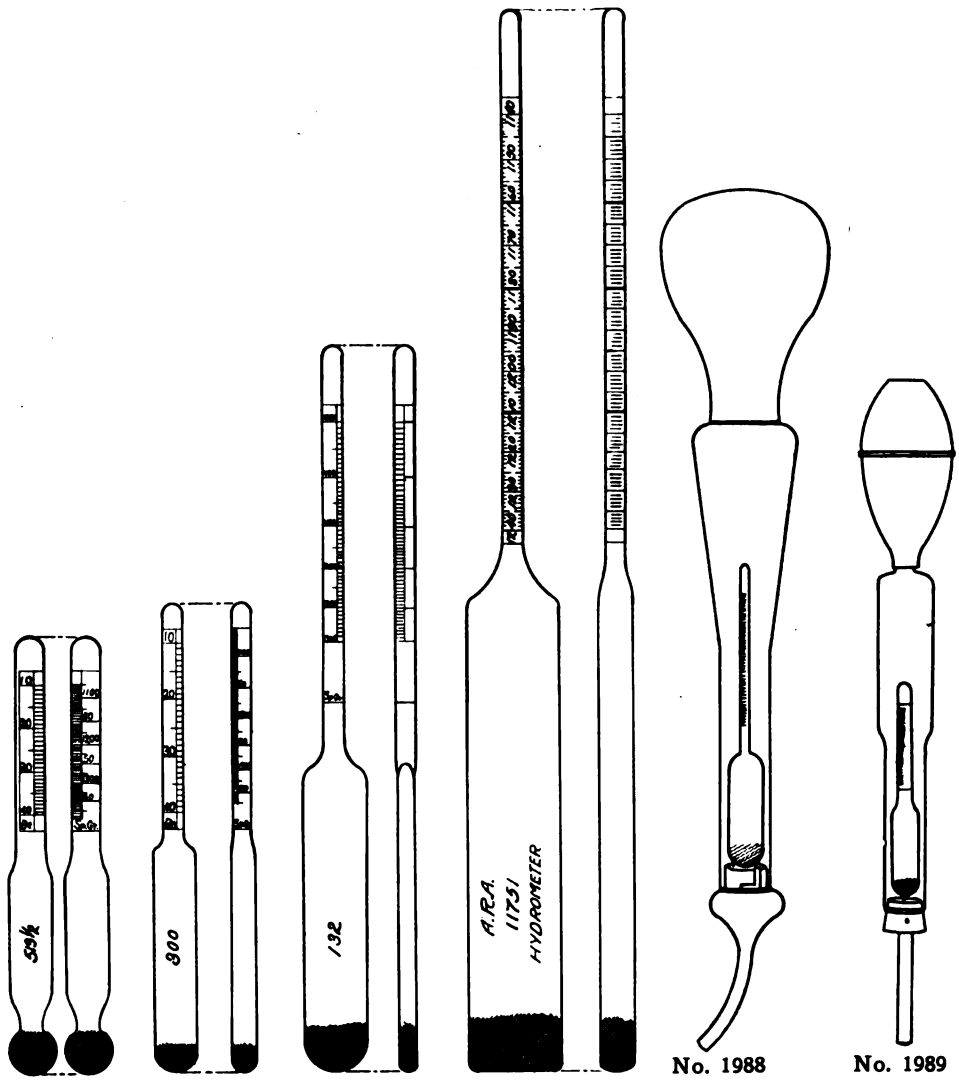
Blue Vitriol

Our Special Brand Blue Vitriol is made especially for railroad trade and is of the highest quality large mesh, carefully washed and dried and put up in barrels of 450 pounds and in kegs of 175 pounds.

Digitized by Google

Hydrometers

STORAGE—COMBINATION—GRAVITY



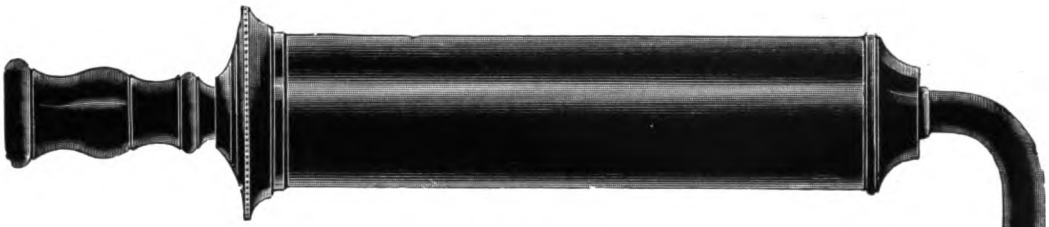
No. 1988 No. 1989

No. 132. Storage Battery Hydrometer, length, 8″; width, ¾″; thickness, ¼″.
No. 300. Combination Storage and Gravity Battery Hydrometer, length, 5¼″; width, ½″; thickness, ¼″.
No. 519½. Combination Storage and Gravity Battery Hydrometer, length, 5″; greatest diameter, ⅝″.
No. 11751. A. R. A. Signal Section Storage Battery Hydrometer, length, 11″; width, 1″; thickness, $\frac{5}{16}$″.
No. 1988. Syringe Hydrometer, complete with float, length over all, 16″.
No. 1988F. Float only for above, length, 5¼″. Scale, 1150 to 1300 sp. gr.
No. 1989. Syringe Hydrometer, complete with float, length over all, 10″.
No. 1989F. Float only for above, length, 4″. Scale, 1100 to 1300 sp. gr.

Accuracy Guaranteed Within One Degree

Digitized by Google

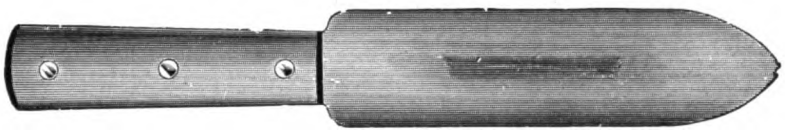
Battery Supplies



FOR HANDLING ACIDS AND SOLUTIONS

No. 6. Hard Rubber Syringe.

FOR CLEANING BATTERIES



No. 1. Battery Knife.

STRAIGHT BATTERY BRUSHES

For Cleaning Zincs

No. 4. Bristle Battery Brush, wood back and handle.

No. 5. Fibre Battery Brush, wood back and handle.

THUMB SCREWS

No. 2753

No. 18959

No. 2753. Pressed Copper Thumb Screw, 8-32 thread.

No. 18959. Cast Brass Thumb Screw, 14-24 thread. A. R. A.

Digitized by Google

Exide Storage Batteries

TYPES KXS, KXCR, KXCS

These batteries are too well known to need any particular introduction. They are produced by the world's largest manufacturers of storage batteries for every purpose—The Electric Storage Battery Company—and embody the experience gained in building all types of storage batteries for the past thirty-eight years.

All six of the types described here are sealed and intended for use with signal systems where it is desirable to house the battery in the same compartment with delicate electrical instruments. Three of them are specially suitable for portable service.

The portable batteries include types KXS, KXCR, and KXCS.

As far as structural details are concerned, these batteries are almost identical. All have rubber jars and the same sturdy plates that have earned for Exide Batteries their splendid reputation for long life and dependability. Grooved wood separators placed between each positive and negative plate are supplemented by slotted hard rubber separators between the positive plates and the wood separators on either side. These separators extending beyond the plates on all four sides, prevent the formation of conducting bridges between plates.

KXCR and KXS Battery in Carrying Case

Between type KXCR and KXS there is a difference in the style of cell cover used, although both are assembled in A. R. A. carrying cases. Type KXCR cells are provided with covers which fit into the top of the jar, with a depressed flange around the edge. This depression forms a channel that is filled with sealing compound. This type is recommended when the cells are assembled in carrying cases at the factory and are not to be removed and handled separately in service.

Type KXS cells are provided with a double flange cover, the two flanges forming a channel on the under side of the cover to receive the upper edge of the jar. This type is recommended if the cells are shipped and handled separately. The wooden carrying cases for Type KXS cells are recessed around the top on the inside, to accommodate the overhang of the double flange covers. Otherwise, as stated above, the two types of cases are identical in design and dimensions.

Type KXCS cells are the same in construction as Type KXCR described above. Instead of being assembled in A. R. A. carrying cases, however, they are assembled in the E. S. B. standard carrying case. The latter differs from the A. R. A. case in the fact that wire handles are provided instead of the strap iron around the ends and bottom of the case, as called for in the A. R. A. design. A bale handle may be included if desired, in which case attachments are furnished that permit the hooked ends of the bale handle to be fastened to the wire handles.

Type KXCS

All cells are shipped assembled, sealed and fully charged. It is only necessary to remove them from their packing cases, set them on a board or shelf, connect adjacent positive and negative terminals, and they are ready for service.

Complete dimensions and capacities of these batteries are given in the table on the opposite page.

Digitized by Google

Exide Storage Batteries

PORTABLE TYPES IN CARRYING CASES

TYPES KXS, KXCR, KXCS

No. of Cells in Case	Type	Outside Dimensions of Case in Inches Length	Width	Height Over Cover	Weight of Complete Battery in Pounds	Catalogue Number Including Cover With Bail Handle	Without Bail Handle
1	KXS-5	4 7/16	7 7/16	10 1/8	12	12828	12843
2	KXS-5	7 5/16	7 7/16	10 1/8	27	12829	12844
3	KXS-5	10 7/16	7 7/16	10 1/8	40	12830	12845
4	KXS-5	13 5/8	7 7/16	10 1/8	53	12831	12846
5	KXS-5	15 1/16	7 7/16	10 1/8	66	12832	12847
1	KXS-7	5 5/16	7 7/16	10 1/8	20	12833	12848
2	KXS-7	9 3/16	7 7/16	10 1/8	40	12834	12849
3	KXS-7	13 1/16	7 7/16	10 1/8	60	12835	12850
4	KXS-7	18 1/16	7 7/16	10 1/8	80	12836	12851
5	KSX-7	22 5/16	7 7/16	10 1/8	100	12837	12852
1	KXS-9	6 7/16	7 7/16	10 1/8	27	12838	12853
2	KXS-9	11 1/16	7 7/16	10 1/8	54	12839	12854
3	KXS-9	17 3/16	7 7/16	10 1/8	81	12840	12855
4	KXS-9	22 5/8	7 7/16	10 1/8	108	12841	12856
5	KXS-9	27 1/16	7 7/16	10 1/8	135	12842	12857
1	KXCS-5	4 3/4	7 7/16	10 5/8	12	12858	12874
2	KXCS-5	7 7/16	7 7/16	10 5/8	27	12859	12875
3	KXCS-5	10 3/16	7 7/16	10 5/8	40	12860	12876
4	KXCS-5	12 7/8	7 7/16	10 5/8	53	12218	12877
5	KXCS-5	15 5/16	7 7/16	10 5/8	66	12861	12878
1	KXCS-7	5 7/16	7 7/16	10 5/8	20	12862	12879
2	KXCS-7	9 1/16	7 7/16	10 5/8	40	12863	12880
3	KXCS-7	13 3/16	7 7/16	10 5/8	60	12219	12881
4	KXCS-7	17 3/8	7 7/16	10 5/8	80	12864	12882
5	KXCS-7	21 1/4	7 7/16	10 5/8	100	12865	12883
1	KXCS-9	7	7 7/16	10 5/8	27	12866	12884
2	KXCS-9	11 1/16	7 7/16	10 5/8	54	12867	12885
3	KXCS-9	16 1/16	7 7/16	10 5/8	81	12220	12886
4	KXCS-9	21 7/8	7 7/16	10 5/8	108	12868	12887
5	KXCS-9	26 3/8	7 7/16	10 5/8	135	12869	12888
1	KXCS-11	8 1/16	7 7/16	10 5/8	33	12870	12889
2	KXCS-11	14 1/16	7 7/16	10 5/8	66	12871	12890
3	KXCS-11	20 1/16	7 7/16	10 5/8	100	12221	12891
4	KXCS-11	26 3/16	7 7/16	10 5/8	133	12872	12892
5	KXCS-11	32 1/2	7 7/16	10 5/8	166	12873	12893
1	KXCR-5	4 7/16	7 7/16	10 1/8	12	12894	12914
2	KXCR-5	7 5/16	7 7/16	10 1/8	27	12895	12915
3	KXCR-5	10 7/16	7 7/16	10 1/8	40	12896	12916
4	KXCR-5	13 5/8	7 7/16	10 1/8	53	12897	12917
5	KXCR-5	16 1/16	7 7/16	10 1/8	66	12898	12918
1	KXCR-7	5 5/16	7 7/16	10 1/8	20	12899	12919
2	KXCR-7	9 3/16	7 7/16	10 1/8	40	12900	12920
3	KXCR-7	13 1/16	7 7/16	10 1/8	60	12901	12921
4	KXCR-7	18 1/16	7 7/16	10 1/8	80	12902	12922
5	KXCR-7	22 5/16	7 7/16	10 1/8	100	12903	12923
1	KXCR-9	6 7/16	7 7/16	10 1/8	27	12904	12924
2	KXCR-9	11 1/16	7 7/16	10 1/8	54	12905	12925
3	KXCR-9	17 3/16	7 7/16	10 1/8	81	12906	12926
4	KXCR-9	22 5/8	7 7/16	10 1/8	108	12907	12927
5	KXCR-9	27 1/16	7 7/16	10 1/8	135	12908	12928
1	KXCR-11	7 9/16	7 7/16	10 1/8	33	12909	12929
2	KXCR-11	14 1/16	7 7/16	10 1/8	66	12910	12930
3	KXCR-11	20 1/16	7 7/16	10 1/8	100	12911	12931
4	KXCR-11	27 1/8	7 7/16	10 1/8	133	12912	12932
5	KXCR-11	33 9/16	7 7/16	10 1/8	166	12913	12933

For length over bail handle, add 1½" to length of KXS and KXCR cases, and 5/8" to length KXCS cases.

Capacity, Ampere Hours

Number of Plates	5	7	9	11
A. R. R. Rating	50	75	100	125
Service (30-60 days)	56	84	112	140
8-hour Discharge	34	51	68	85

Digitized by Google

Exide Storage Batteries

TYPE KXHS

Exide cells of this general type are the standard on more railroads than any other cell. They are in use for the operation of automatic signals, crossing signals, slot circuits, etc., in conjunction with the A. C. Floating Battery System. Hundreds of thousands of this and similar types are produced annually. This large production makes it possible to offer in the KXHS cell, an article uniformly high in qualitly and capable of maximum service.

KXHS

The plates are suspended from the "Gummite" cover. Grooved wood separators are placed between adjacent positive and negative plates with slotted hard rubber separators between the positive plates and the wood separator on either side. The separators extend beyond the plates on all four sides, thus effectually preventing the formation of conducting bridges between the plates.

The cells are assembled in glass jars fully sealed and are shipped filled and charged.

Intercell and terminal connection is made by means of insulated copper wire equipped with terminals. The design of the cell is such as to prevent corrosion of the wire. One insulated copper wire intercell connector is provided with each cell.

Following are the dimensions and capacities of these cells.

Type and Number of Plates Per Cell	Capacity Amp. Hours A. R. A. Rating	Capacity Amp. Hours Service Rating	Normal Charge Rate	Complete Cell Outside Dimensions, Inches Length	Width	Height Over All	Approx. Weight Pounds
KXHS- 5	50	56	4	4 7/8	8 1/8	12 5/8	22
KXHS- 7	75	84	6	4 7/8	8 1/8	12 5/8	24
KXHS- 9	100	112	8	7 1/16	8 1/8	12 5/8	34
KXHS-11	125	140	10	7 1/16	8 1/8	12 13/16	36
KXHS-13	150	168	12	7 1/16	8 1/8	12 13/16	38
KXHS-15	175	196	14	8 9/16	8 1/8	12 13/16	44
KXHS-17	200	224	16	8 9/16	8 1/8	12 13/16	46
KXHS-19	225	252	18	10 1/16	8 1/8	12 13/16	52
KXHS-21	250	280	20	10 1/16	8 1/8	12 13/16	54

Digitized by Google

Exide Storage Batteries

TYPES BTM, CTM and PTM

Single Cell, Type BTM

5-Cell Unit, Type BTM

Cells of the *BTM, *CTM and *PTM types are identical except for size and capacity. These cells are of the two plate type in glass jars with sealed hard rubber covers. The positive plates are of the Manchester type, the negative plates of the Exide type. The plates are burned to straps provided with cylindrical posts sealed to the covers with rubber gaskets and grease ring seal nuts and are supported from the covers. Exide standard soft rubber vent plug is used. Substantial wood separators grooved on both sides are inserted between the plates.

These types are especially adapted for telephone and telegraph service when there is a requirement for low capacity and high voltage.

The cells are shipped, filled and charged either as single cells or assembled in wood trays of five or ten cells each, the adjacent cells being connected by burned alloy intercell connectors. The terminal cells of each tray are equipped with terminal lugs adapted for bolt connectors.

	BTM		CTM		PTM	
Type	Weight (lbs.)	Cat. No.	Weight (lbs.)	Cat. No.	Weight (lbs.)	Cat. No.
Single Cell	4	15324	8	15325	14	15655
5-Cell Unit	26	15326	45½	15327	81¼	15647
10-Cell Unit	52	15328	91	15329	163	15652

*Capacities of BTM—8-hr. rate, 6 amp. hours; intermittent rate, 7½ amp. hours.
*Capacities of CTM—8-hr. rate, 12 amp. hours; intermittent rate, 15 amp. hours.
*Capacities of PTM—8-hr. rate, 24 amp. hours; intermittent rate, 30 amp. hours.

Digitized by Google

Exide Storage Batteries

TYPES DMG and EMG

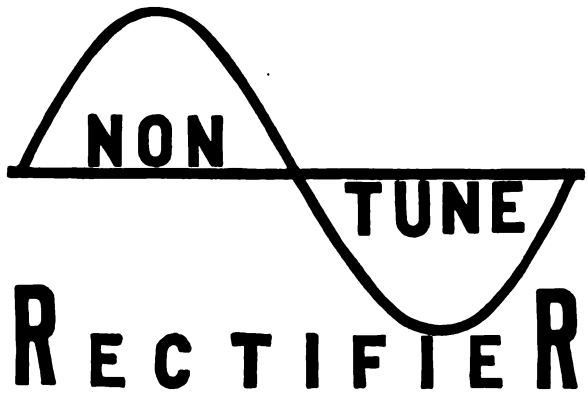
Types DMG and EMG are identical except for size and capacity. They are Chloride Accumulators with this distinct advantage: They are entirely sealed except for a small opening in the vent plug. They are shipped filled and charged. Placing them in service consists simply in unpacking them and connecting the adjacent cells. It is hard to conceive of a battery of a more satisfactory type than the DMG or the EMG for stationary service. Whether the work be heavy or light, whether they are "floated" or cycle charged; for Interlocking; for Low Voltage Switch Machines, for Automatic Signals, or where high capacity is required in Telegraph and Telephone service.

The separators are of heavy, specially selected, treated wood, grooved on both sides. The plates are supported on soft rubber cushions and suspended from the "Gummite" cover.

Intercell and terminal connection is made by means of insulated copper wire equipped with terminals. The design of the cell is such as to prevent corrosion of the wire. One insulated copper wire intercell connector is provided with each cell.

Type of Cell	Approx. Weight, Pounds	Cat. No.	Width, Inches	Length, Inches	Height over Strap Post, Inches	Capacity Amp. Hrs. 8-Hr. Rate	72-Hr. Rate
EMG-5	58	14463	10	7⅛	16⅛	80	96
EMG-7	80	14464	10	7⅛	16⅛	120	144
EMG-9	100	14465	10	7⅛	16⅛	160	192
DMG-3	25	14256	8⅛	4⅞	14⅜	20	28
DMG-5	30	14257	8⅛	4⅞	14⅜	40	56
DMG-7	43	14258	8⅛	7 1/16	14⅜	60	84
DMG-9	48	14259	8⅛	7 1/16	14⅜	80	112

Digitized by Google



Trade Mark Registered

Section 8

Contents

NON-TUNE RECTIFIERS
POWER-OFF RELAYS
TRANSFORMERS
LIGHTING UNITS

NOTE: This section of the catalogue is available in Bulletin form. Bulletin No. 3 will be furnished upon request.

Digitized by Google

Universal Non-Tune Rectifier

TWO RECTIFIERS IN ONE

Type No. 100

The Type No. 100 Universal Non-Tune Rectifier is the most flexible in application to the various requirements that has been devised. It is designed for the simultaneous charging of two separate batteries. There may be one track battery and one signal battery, two separate track batteries or two separate signal batteries.

It will be noted from the circuit diagram, C-4420, that two separate transformer secondaries are provided with the contacts on the vibrating unit insulated from each other. Therefore, the two batteries are insulated from each other and from the A. C. line making their use on separate circuits entirely safe. It will also be noted that taps for charging either a track or a signal battery are brought out from each secondary so that either side may be used to charge a track or a signal battery.

In order to charge a track battery the hexagon head connecting stud on the side which is to be used must be placed in the threaded hole below the contact screw and a track battery variable resistance placed on the binding posts which are set diagonally on the panel. If a signal battery is to be charged the hexagon head stud must be placed in the hole above the contact screw and the signal battery resistance placed on the binding posts.

Type No. 100
Patents Pending

As the Rectifier in the illustration is arranged, with both studs in the lower holes, the Rectifier is equipped to charge two separate track batteries. If two signal batteries were to be charged the two hexagon head studs would be placed in the holes above the contact screws and signal battery resistances placed on the binding posts. When the Rectifier is arranged to charge one signal battery and one track battery one stud must be placed in the hole above the contact screw and the other stud in the hole below the contact screw on the opposite side. A signal battery resistance would be placed on one side and a track battery resistance on the other.

The maximum charging rate for one side of the Rectifier is ½ ampere for signal battery of 5 to 20 volts, variable in 30 milliampere steps from 140 milliamperes to ½ ampere and for track battery of 1.2 to 4 volts it is 1 ampere, variable in 60 milliampere steps from 280 milliamperes to 1 ampere. When necessary to have a higher charging rate than the maximum provided by the use of one side of the Rectifier it may be obtained by connecting the two sides in multiple, thus making a double or full wave rectifier having a maximum charging rate capacity of 1 ampere on signal battery and 2 amperes on track battery. This provides for the quick restoration of a battery which may have become partially or wholly discharged.

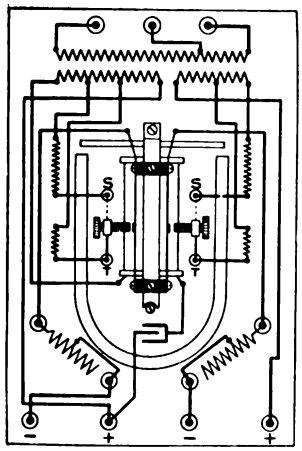
Digitized by Google

Universal Non-Tune Rectifier

TYPE No. 100—(Continued)

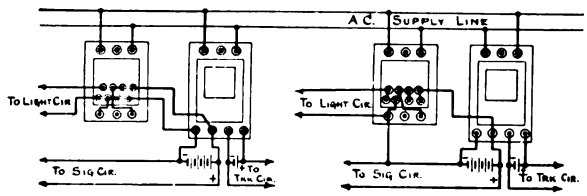
In order to obtain proper regulation of the charging rates it is necessary that the variable resistances be designed for batteries of given voltage. This necessitates specifying what resistances are required for the normal operation of the rectifier. However, in emergencies, the track battery resistance may be used when the rectifier is to charge a signal battery, and vice versa, providing, of course, that the hexagon head connecting stud is properly placed.

Taps will be brought out from each secondary to charge track battery of any specified voltage between 1.2 and 4 volts and signal battery of any specified voltage between 5 and 20 volts.

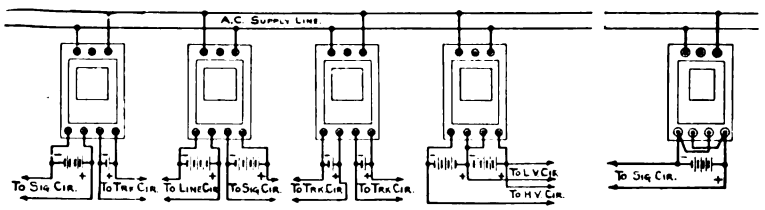


C-4420
Circuit Diagram Type No. 100

The rectifiers can be furnished for operation on any specified commercial alternating current circuit up to 440 volts. A compensating tap is always provided on the primary to care for low line voltage or line drop.



Typical Applications of Type No. 100 Universal Non-Tune Rectifier and a Lighting Unit



Five of the most common applications of the Type No. 100 Universal Non-Tune Rectifier. Many other uses will suggest themselves when the flexibility of this type is fully realized.

When ordering the Universal Non-Tune Rectifiers, specify the following:

Type No. 100.

The primary voltage and frequency.

The voltage of track batteries to be charged.

The voltage of signal batteries to be charged.

The resistances required.

For convenience in ordering, a sample specification is given below:

"Type No. 100 Universal Non-Tune Rectifier 100-115 volts 60 cycles to charge 2 and 10 volt battery with resistances to charge 2 volt battery from one side and 10 volt battery from the other."

Digitized by Google

Non-Tune Rectifier

TYPE No. 114

Utilizing One-Half of the A. C. Wave

The Type No. 114 Non-Tune Rectifier is of the half or single wave type and has a maximum continuous charging rate of ½ ampere on signal batteries above 5 volts and of 1 ampere on track batteries of 1.2 to 4 volts.

The charging rate on signal batteries is adjustable in 30 milliampere steps from approximately 140 milliamperes to ½ ampere and on track batteries in steps of 60 milliamperes from 280 milliamperes to 1 ampere. The adjustable resistance is mounted on the Rectifier panel. The center spacing of the terminal holes in 2⅜ inches so that when desired, the resistance may be removed from the Rectifier and placed on an A. R. A. porcelain terminal block. The binding posts on the Rectifier, from which the resistance was removed, should then be connected together to complete the charging circuit.

Each Rectifier is provided with proper secondary taps for charging either a track or signal battery. In order to change from a track battery to a signal battery charger, it is only necessary to move the hexagon head connecting stud from the hole below to the hole above the active or left hand contact. This stud connects the stationary contact screw to the proper transformer tap for charging track or signal battery, as the case may be. The resistances for charging batteries of different voltages are not interchangeable, however, making it necessary to specify whether track or signal battery resistance is required. However, in emergency the resistance for a track battery may be used when signal battery is being charged and vice versa although the adjustments will not be as accurate as those obtained with the proper resistance.

Type No. 114
Patents Pending

The fact that the same Rectifier may be used for charging either track or signal battery will be found of great benefit on installations where a number of Rectifiers are involved. For example, on a territory where all track batteries are 2 volts and signal batteries are 10 volts, the Rectifiers on the entire territory may be exactly alike, so that they will be interchangeable from track to signal circuits, except for the variable resistance, which should be of the proper value for the battery being charged.

An alternating current tap for lighting signal lamps with low voltage A. C. is taken off the secondary of the transformer when specified. The standard capacities of the lighting tap are 40 watts and 80 watts, as specified. In most cases the voltage of this tap is the same as the voltage of the signal battery to be charged, but will be furnished with any voltage specified.

The power-off relays for use with Rectifiers having A. C. lighting taps are shown on page 234. The use of the relay provides for lighting the signal lamps normally with low voltage A. C. supplied by the Rectifier transformer and automatically connects the light circuit to the reserve storage battery in cases of A. C. power failure.

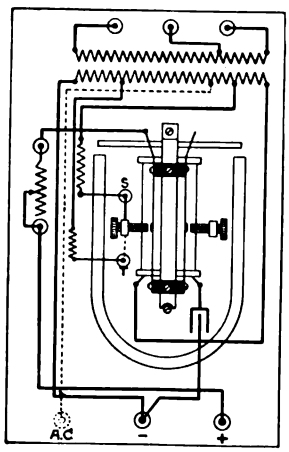
The voltage variation of the lighting tap from no load to full load is seldom in excess of 5% of normal voltage.

Digitized by Google

Non-Tune Rectifier

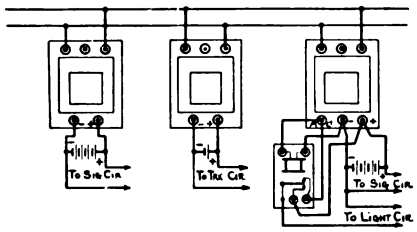
TYPE No. 114—(Continued)

The Rectifier is furnished for operation on any specified commercial alternating current circuit up to 440 volts, to charge battery of any specified voltage up to 24 volts. A compensating tap is always provided on the primary to care for low line voltage or line drop.



C-4429

Type No. 114 Circuit Diagram



Typical uses of the Type No. 114 and No. 119 Non-Tune Rectifiers, showing the connections for using the Rectifier for charging Signal Battery, Track Battery and Signal Battery where the Power-off relay is employed and lamps are electrically lighted.

When ordering, specify the following:

Type No. 114 Non-Tune Rectifier.
The primary voltage and frequency.
The voltage of the track battery to be charged.
The voltage of the signal battery to be charged.
Which variable resistance is required.
Whether or not A. C. lighting tap is desired and if so the voltage and capacity thereof.

For convenience in ordering, a sample specification is given below:

"Type No. 114 Non-Tune Rectifier, 100-115 volts, 60 cycles to charge 2 and 10 volt battery, with signal battery resistance and with 10 volt, 40 watt, A. C. light tap."

Digitized by Google

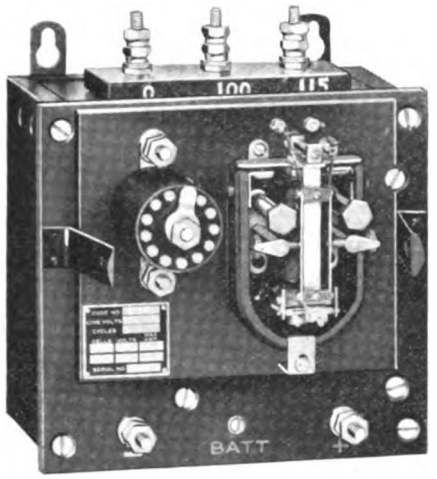
Non-Tune Rectifier

TYPE No. 119

UTILIZING EITHER ONE-HALF OR BOTH HALVES OF THE A. C. WAVE

The Type No. 119 Non-Tune Rectifier is, in appearance and application, much the same as the Type No. 114, but it is of the double or full wave type, having a maximum charging rate of 1 ampere on signal batteries and 2 amperes on track batteries. The load on each contact is but half the total charging rate of the Rectifier, insuring long contact life.

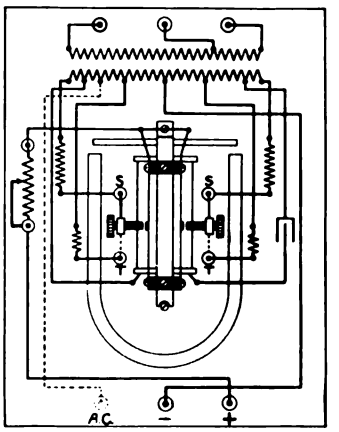
The Type No. 119 is furnished for operation on any specified commercial alternating current circuit up to 440 volts to charge track battery of specified voltage from 1.2 to 4 volts and signal battery of any specified voltage from 5 to 16 volts.



Type No. 119
Patents Pending

In order to change the No. 119 Rectifier from a track battery to a signal battery charger, it is only necessary to move the two hexagon head connecting studs from the holes below the contact screws to the holes above these screws and apply the signal battery variable resistance, in place of the track battery resistance.

The charging rate is adjustable by means of the variable resistance mounted on the panel in 60 milliampere steps from approximately 280 milliamperes to 1 ampere on signal battery and in steps of 120 milliamperes from 500 milliamperes to 2 amperes on track battery. When the minimum charging rate obtainable with the variable resistance is more than the requirement at any particular location, the charging rate may be further reduced by cutting out one-half of the wave, by entirely removing one of the hexagon head studs which is used to change from the track to the signal charging taps. This will result in a single wave Rectifier with a charging rate on signal battery of 140 milliamperes to ½ ampere, adjustable in 30 milliampere steps and on track battery a charging rate of 280 milliamperes to 1 ampere will be obtained adjustable in 60 milliampere steps.



C 4425

Type No. 119
Circuit Diagram

Except that the Type No. 119 is of double or full wave type, having twice the charging rate capacity of the Type No. 114, it is the same in application. A. C. taps for lighting, of either 40 watts or 80 watts capacity, are furnished when specified as described in connection with the Type No. 114 on page 226.

When ordering, specify the following:

Type No. 119 Non-Tune Rectifier.
The primary voltage and frequency.
The voltage of the track and signal batteries to be charged.
Which variable resistance is required.
Whether or not A. C. lighting tap is desired and if so, what voltage and capacity it should be.

For convenience in ordering, a sample specification is given below:

"Type No. 119 Non-Tune Rectifier, 100-115 volts, 60 cycles to charge 2 and 10 volt battery, with resistance for charging 10 volt battery and with 10 volt A. C. lighting tap of 40 watts capacity."

Digitized by Google

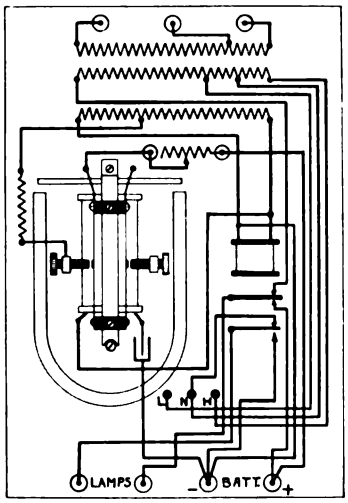
Non-Tune Rectifier

TYPES No. 106 AND No. 107
Rectifier and Lighting Unit Combined

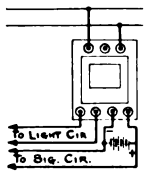
TYPE No. 106
Rectifier Utilizes One-Half of the A. C. Wave

The Type No. 106 Rectifier is identical with the Type No. 102, described on pages 230 and 231, except that the lighting circuit is taken from a separate transformer secondary and the relay is arranged to carry both sides of the lighting circuit. This absolutely insures the light circuit against high voltages straying in through other circuits and burning out lamps.

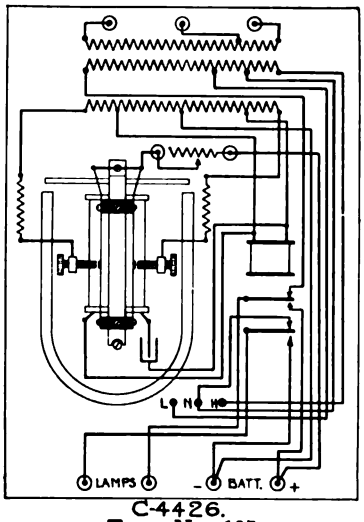
The charging rate is adjustable in 30 milliampere steps from 140 milliamperes to ½ ampere on batteries of specified voltage up to 24 volts. Three A. C. lighting taps are provided for regulation of the voltage at the lamps and the standard lighting capacities are 40 watts and 80 watts as specified.



C-4419.
Type No. 106
Circuit Diagram



Application
Circuit
Types No. 106
and No. 107



C-4426.
Type No. 107
Circuit Diagram

TYPE No. 107
Rectifier Utilizes Both Halves of the A. C. Wave

The Type No. 107 Rectifier is identical with the Type No. 106, except that the charging unit is of the double or full wave type, providing a maximum charging rate of 1 ampere adjustable in steps of 60 milliamperes from 280 milliamperes to 1 ampere on batteries of specified voltage up to 16 volts.

Types No. 106 and No. 107
Patents Pending

When ordering, specify the following:

Type No. 106 or No. 107 Non-Tune Rectifier.
The Primary voltage and frequency.
The voltage of the battery to be charged.
The voltage of the A. C. lighting taps.
The lighting capacity required.

For convenience in ordering, a sample specification is given below:

"Type No. 106 (or No. 107) Non-Tune Rectifier, 100-115 volts 60 cycles to charge 12 volt battery with lighting taps of 11, 12 and 13 volts and lighting capacity of 80 watts."

Digitized by Google

Non-Tune Rectifier

TYPES No. 102 AND No. 103

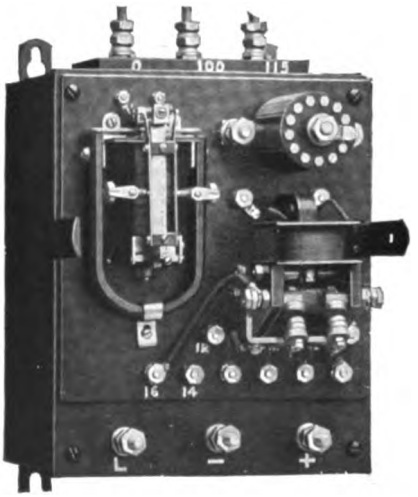
Rectifier and Lighting Unit Combined

Rectifier Utilizes One-Half of the A. C. Wave

The Type No. 102 and No. 103 Non-Tune Rectifiers are unsurpassed for use with Position and Color Light Automatic Signals, Flashing Light Crossing Signals, etc. They provide means of charging a Storage Battery and normally lighting the Signal Lamps by low voltage alternating current, with D. C. reserve, combined in one instrument.

The rectifying movement is the same as that of the Type No. 114. It is of the single or half wave type, having a maximum charging rate of ½ ampere. Regulation of the charging rate is accomplished by the variable resistance, mounted on the Rectifier panel, in steps of 30 milliamperes from approximately 140 milliamperes to ½ ampere.

In addition to the charging unit 3 secondary taps are taken off the transformer for lighting the Signal Lamps direct with low voltage alternating current. These taps are usually arranged to be one volt below, equal to and one volt above the normal voltage of the storage battery to be charged, assuming that the normal lamp voltage is the same as the voltage of the storage battery. The 3 A. C. taps provide for regulation of the voltage of the lamps irrespective of the voltage of the power supply line. Any 3 lighting voltages will be furnished to specification.



Types No. 102, No. 103, No. 104 and No. 105
Patents Pending

A highly efficient and thoroughly reliable A. C. relay is incorporated in the Rectifiers, which permits normal lighting of the Lamps with low voltage alternating current and automatically connects the lighting circuit to the reserve storage battery in cases of A. C. power failure.

The Rectifiers will be furnished for operation on any specified commercial alternating current circuit up to 440 volts and to charge a battery of any specified voltage up to 24 volts. A compensating tap on the primary will care for low line voltage or line drop.

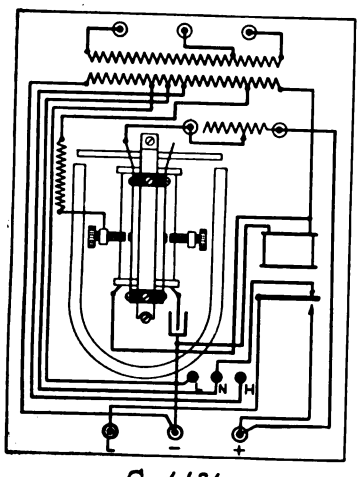
Digitized by Google

Non-Tune Rectifier

TYPES No. 102 AND No. 103—(Continued)

The standard lighting capacities of the Type No. 102 Rectifier are 40 watts or 80 watts as specified, while the lighting capacity of the Type No. 103 Rectifier is 150 watts. The lighting voltage variation is approximately 5% from no load to full load. This is extremely close regulation, requiring well designed transformers and the use of ample iron and copper.

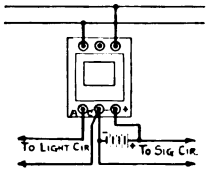
In every respect, except lighting capacity the Types No. 102 and No. 103 Rectifiers are identical.



C 4424

Types No. 102 and No. 103 Circuit Diagram

A relay of either 8 or 16 amperes carrying capacity will be furnished, depending upon the requirements of the maximum lighting load specified.



Showing application of Non-Tune Rectifiers No. 102, No. 103, No. 104 or No. 105.

When ordering, specify the following:

Type No. 102 Non-Tune Rectifier, if lighting capacity is to be 80 watts or less.
Type No. 103 Non-Tune Rectifier, if lighting capacity is to be over 80 watts, but not exceeding 150 watts.
The primary voltage and frequency.
The voltage of the battery to be charged.
The voltages of the A. C. lighting taps.
The lighting capacity required

For convenience in ordering, a sample specification is given below:

"Type No. 102 Non-Tune Rectifier, 100-115 volts, 60 cycles, to charge 12 volt battery, with lighting taps of 11, 12 and 13 volts and lighting capacity of 80 watts."

Digitized by Google

Non-Tune Rectifier

TYPE No. 109

For Charging High Voltage Batteries

The Type No. 109 Non-Tune Rectifier is very similar to the Type No. 119 described on page 228, except that in place of the fixed resistances, shown in the circuit diagram C-4425, two 50 watt, 50 volt lamps are used for limiting resistances. These lamps are screwed into sockets set into the side of the transformer case, as indicated in the application diagrams below. External variable resistance should be used to control the charging rate, as no resistance for regulation of the charging rate is provided on the Rectifier.

The Rectifier is of the double or full wave type, giving a maximum continuous charging rate of ½ ampere, which equals ¼ ampere per contact. It can be furnished for connection to 60 cycle supply lines of either 110 volts or 220 volts as specified, to charge any lead type storage battery of a specified number of cells between 20 and 30.

To provide for control of the charging rate below the maximum value, the use of our No. 8325, 45 ohm rheostat is recommended and to indicate the charging rate we suggest that a pattern No. 33 ammeter with 0 to 1 ampere scale be used.

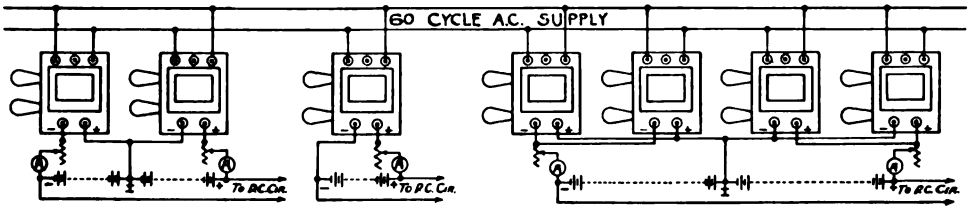


Figure "B" **Figure "A"** **Figure "C"**

Figure "A" in the application diagrams gives the proper connections for charging 20 to 30 cells of lead type battery at a maximum continuous rate of ½ ampere, which equals 12 ampere hours per day. Any battery of not to exceed 30 cells or approximately 64 volts may be charged by this method where the average output, plus the battery losses, does not exceed 12 ampere hours per day. This arrangement is frequently used to maintain idle cells in a charged condition when they are stored for a considerable time before placing them in regular service.

Figure "B" shows the use of two Rectifiers charging two banks of 20 to 30 cells each at a maximum continuous rate of ½ ampere. This provides sufficient current for maintaining the battery of small electric interlocking plants, where a continuous rate of ½ ampere or less will compensate for the output, plus the losses of a battery not exceeding 60 cells or approximately 128 volts. Frequently interlocking plants are closed during certain seasons of the year or are out of service undergoing heavy repairs, in which cases the battery may be kept in perfect condition by the use of this scheme.

In Figure "C" connections are given for using four Type No. 109 Non-Tune Rectifiers to charge two banks of 20 to 30 cells each. This combination provides for a continuous charging rate of 1 ampere or 24 ampere hours per day on 40 to 60 cells or a battery not exceeding 128 volts. This rate is sufficient to maintain the battery on many small electric interlocking plants and has frequently supplanted the motor generator or gasoline engine generator set on interlocking batteries.

The low first cost and high efficiency make the installation of these Rectifiers most economical wherever their maximum continuous charging rate is equal to or in excess of the average daily output of the battery, plus the battery losses.

It will be noted that in application diagrams "B" and "C" an ammeter and a rheostat are used for each bank of cells. This is desirable in order that the charging rates may be maintained at equal values.

When ordering equipment for charging high voltage battery, specify the following:

Type No. 109 Non-Tune Rectifier.

The primary voltage and a frequency of 60 cycles.

The number of cells of lead type battery to be charged.

For convenience in ordering, a sample specification is given below:

"Type No. 109 Non-Tune Rectifier, complete with lamps for 100-115 volts, 60 cycles, to charge 28 cells of lead type battery. No. 8325, 45 ohm rheostat. Pattern No. 33 D. C. ammeter, 0 to 1 ampere scale."

Digitized by Google

Lighting Transformers

WALL MOUNTING—TYPES No. 52 AND No. 53

These lighting transformers are designed for use in connection with electric lights and other A. C. apparatus of low voltage to reduce the supply line voltage to the proper value for the apparatus employed.

The primaries will be wound for connection to any specified commercial alternating current circuit up to 230 volts. A compensating tap on the primary is always provided to care for low line voltage or line drop.

Lighting Transformer Type No. 52

Taps for one, two or three secondary voltages will be provided as specified. Three secondary voltages will be provided, unless otherwise specified, with taps arranged to be one volt below, equal to and one volt above the normal specified secondary voltage.

Standard capacities are 40 watts, 80 watts or 150 watts as specified. Transformer regulation is extremely close. Secondary voltage variation from no load to full load is seldom in excess of 5% of normal voltage.

These transformers are ideal for signal lighting, etc. A. R. A. binding posts are provided on both primary and secondary, making quick connections possible.

Two types are standard as follows:

Type No. 52 which can be furnished with either 40 watts or 80 watts capacity when to be used on 50 to 60 cycle supply lines and with capacity of 40 watts only when to be used on supply lines of 25 to 40 cycles.

Type No. 53 which can be furnished with either 80 watts or 150 watts capacity for use on 25 to 40 cycle supply lines and with capacity of 150 watts on supply lines of 50 to 60 cycles.

The case of the No. 53 transformer is somewhat larger than that of the No. 52 Transformer, owing to the larger transformer required.

When ordering, specify the primary voltage and frequency, the secondary voltage or voltages and the capacity.

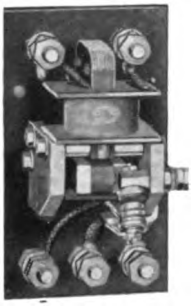
For convenience in ordering, a sample specification is given below:

"Type No. 52 (or No. 53) Lighting Transformer. Primary 100-115 volts, 60 cycles. Secondary 11, 12 and 13 volts. Capacity, 80 watts."

Digitized by Google

A. C. Power-Off Relays

WITH OR WITHOUT DUSTPROOF COVER



Type No. 200

It is seldom desirable to depend entirely upon alternating current for the lighting of signal lamps, due to the possibility of lights being out during A. C. power failures.

These A. C. power-off relays provide for normally lighting lamps with alternating current and automatically connect the lighting circuit to a reserve source of energy, usually storage or primary battery, in cases of A. C. power failure.

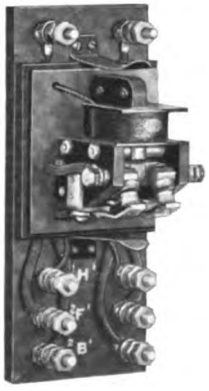
The coils of these relays can be wound to operate on any specified A. C. voltage up to 220 volts of any frequency from 25 to 60 cycles.

They are made with one or two dependent front or back contacts as required and with dustproof, glass front covers when specified.

The No. 200 without cover (illustrated) and also No. S-200 with dustproof cover are single contact relays having 1 front and 1 back dependent contact with a carrying capacity of 10 amperes.

The No. 201 without cover and No. S-201 with dustproof cover (both illustrated) are double contact relays having 2 front and 2 back dependent contacts with a carrying capacity of 10 amperes each or 20 amperes if connected in multiple.

The coils of these four relays will consume approximately 2.2 watts. The relays described below are believed to be the most efficient on the market as they are designed to consume not more than 0.75 watt.



No. S-201
With Cover Removed

No. 208 and No. S-208 are single contact relays, identical with the Nos. 200 and S-200, except that they have an increased efficiency and consume but 0.75 watt or less.

No. 209 and No. S-209 double contact relays similar to No. 201 and No. S-201, except that the energy consumption is not to exceed 0.75 watt.

These relays are only slightly more expensive than those consuming 2 watts or more and the saving of 1.25 watts per hour will soon pay the extra first cost of the more efficient relay.

Type No. 201

When ordering, specify the voltage and frequency for which the relay coil is to be wound.

Description

Energy Consumption Approximately 2.2 Watts

No. 200. Single contact power-off relay.
No. S-200. Single contact power-off relay with dustproof, glass front cover.
No. 201. Double contact power-off relay.
No. S-201. Double contact power-off relay with dustproof, glass front cover.

Energy Consumption Not to Exceed 0.75 Watt

No. 208. Single contact power-off relay.
No. S-208. Single contact power-off relay with dustproof, glass front cover.
No. 209. Double contact power-off relay.
No. S-209. Double contact power-off relay with dustproof, glass front cover.

Let Us Figure on Special A. C. Relays for Particular Requirements

Digitized by Google

Universal Lighting Unit

The Universal Lighting Unit combines a power-off relay and transformer in one unit and is adaptable to color and position light signals, semaphore and dwarf signal lighting, flashing light crossing signals, etc.

The transformer furnishes low voltage A. C. for normally lighting the lamps through the front contacts of the power-off relay and when A. C. power is off the relay automatically connects the light circuit to the reserve source of energy, usually storage battery, kept fully charged by the A. C. Floating Battery System, or Primary Battery.

The transformers are insulated in accordance with A.I.E.E. specifications, unless otherwise ordered, and are furnished in standard capacities of 80 watts or 150 watts as required. Transformer efficiency is 88% and secondary voltage variation from no load to full load is not in excess of 6%.

With Cover Removed

Primary windings for 100-115 volts, 200-230 volts or 400-450 volts, either 25 cycles, 30 cycles, 40 cycles, or 60 cycles will be furnished as specified.

The contacts of the power-off relay have a carrying capacity of 10 amperes each.

The relay may be of either the double or single contact type on the 80-watt unit, depending upon whether it is desired to switch both sides of the light circuit from A. C. to D. C., or to make one side common to both A. C. and D. C. and switch only one side with the power-off relay. On the 150-watt unit the relay is always double contact with the two contacts connected in multiple, being in effect, so far as circuit is concerned, a single contact relay with twice the carrying capacity of one contact or 20 amperes.

The relay of the No. 350 Universal Lighting Unit consumes approximately 2.2 watts while the relay of the No. 352 unit consumes 0.75 watt or less. In all other respects the units are identical.

The relay coil is operated from the entire secondary of the transformer to guard against false operation of the relay in cases of open circuits in any portion of the transformer winding.

A metal housing encloses the transformer and a glass front, dust-proof cover is provided for protection of the relay.

All binding posts for external connections are A. R. A. Signal Section Standard.

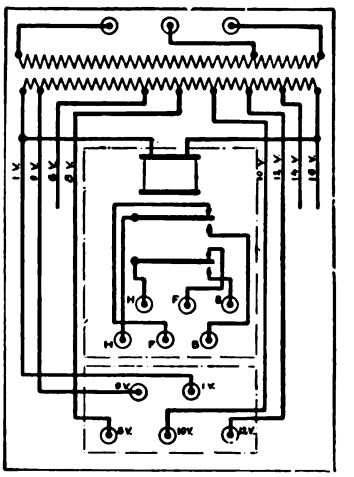
Digitized by Google

Universal Lighting Unit

By reference to the circuit diagram C-4449, it will be seen that secondary taps at 1, 0, 6, 8, 10, 12, 14 and 16 volts are brought out. The 0 and 1 volt taps are always terminated and any three of the even voltage taps will be terminated as specified. The other three taps not terminated are tagged, taped up and left in the case so that the purchaser may terminate any or all of them should voltages other than those specified be desirable at some future time. The terminals are marked with tags which can be removed when the terminated taps are changed and the tags on the taped up taps may be placed on the terminal to which the wire is attached whenever changes are made.

The flexibility of the arrangement of this unit is at once apparent.

A unit shipped out with the 0, 1, 8, 10 and 12 volt taps terminated, as illustrated in the circuit diagram, has secondary voltage adjustments of 8, 9, 10, 11, 12 and 13 volts and in addition 1 and 2 volt taps are available.



C-4449
Circuit Diagram

In addition to tagging, all leads from the transformer are color coded to permit of identification of the various wires should the tags become lost. A special color code circuit diagram for this purpose is printed on the instruction card furnished with each unit.

When ordering specify the following:

Whether single or double contact relay is desired and whether No. 350 or No. 352 unit is desired.

Primary voltage and frequency.

The three even voltage taps to be terminated.

Secondary capacity.

For convenience in ordering sample specifications are given below:

No. 350. Universal Lighting Unit with standard double contact relay. Primary 100-115 volts, 60 cycles, Secondary taps 8, 10 and 12 volts to be terminated, capacity 80 watts.

No. 352. Universal Lighting Unit with 0.75 watt double contact relay. Primary 100-115 volts, 60 cycles, Secondary taps 8, 10 and 12 volts to be terminated, capacity 80 watts.

Digitized by Google

Lighting Units

TYPES No. 300 and No. 301

Transformer and Power-Off Relay Combined

The lighting units provide for normally lighting signal lamps with low voltage alternating current from the secondary of the transformer through the front contacts of the power-off relays and for reserve lighting of the lamps from battery through the back contacts of the relays in cases of A. C. power failures.

The lighting units are made in three standard capacities of 40 watts, 80 watts and 150 watts with single contact relays, of 8 amperes carrying capacity or double contact relays, of 8 amperes carrying capacity when connected to carry both sides of the lighting circuit and 16 amperes carrying capacity when the contacts are connected in multiple.

The transformer regulation is extremely close. Secondary voltage variation from no load to full load is seldom in excess of 5% of normal voltage.

Lighting Unit Type No. 300

Taps for one, two or three secondary voltages will be furnished as specified. Unless otherwise specified three secondary voltages will be provided with taps arranged to be one volt below, equal to and one volt above the normal specified lamp voltage. A compensating tap on the primary is always provided to care for low line voltage and line drop.

These types have dust-proof hinged covers opening to the right, which entirely enclose the relay yet permit ready access for inspection.

The Type No. 300 lighting unit may be furnished for use on 60 cycle supply up to 230 volts, with any 3 secondary voltages specified, with capacity of 80 watts and with double contact relay of 8 amperes carrying capacity.

The Type No. 301 lighting unit is identical with the number 300 except that it is furnished for use only on 25 cycle supply and the case is somewhat larger, because of the larger transformer required.

Digitized by Google

Voltage Reduction Transformers

WALL MOUNTING

Types No. 60 and No. 61

In many cases where long A. C. Supply lines are necessary, the voltage must be 220 volts or 440 volts, in order to keep the size of copper used in the line within reasonable limits.

On most railroads it is desired not to make connection of these higher voltages direct to Rectifiers, lighting units and other A. C. apparatus, both because of the danger of injury to persons working about the instruments and because most of the apparatus is constructed for connection to 115 volt supply. By reducing higher line voltages to this value, all apparatus may be made alike so that it may be interchanged without regard to the supply line voltage.

Transformer Type No. 60

The Type No. 60 transformer was designed for reducing 440 volts to 115 volts and has a capacity of 100 watts.

The Type No. 61 transformer is for reducing 220 volts to 115 volts and also has a capacity of 100 watts. Either type will be furnished for connection to supply lines of any specified commercial frequency. Special transformers will be furnished to specifications.

Primary and secondary leads are brought out through porcelain bushings, secured in the steel case. The leads are 12 inches long of No. 14 B. & S. gauge R. C. D. B. stranded copper wire. Mounting lugs are provided for convenience in fastening the transformers to the wall.

When ordering, specify the following:

Type No. 60 (or 61).
The primary voltage and frequency.
The secondary voltage and capacity.

For convenience in ordering, a sample specification is given below:

"Type No. 61 wall mounting transformer. Primary 440 volts, 60 cycles. Secondary, 115 volts. Capacity, 100 watts."

Digitized by Google

Variable Resistances or Rheostats

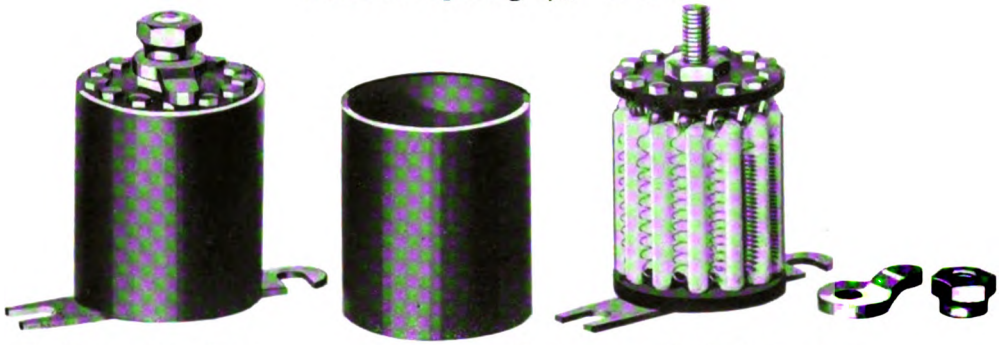
No. 8325 VARIABLE RESISTANCE OR RHEOSTAT

The rotary type variable resistance or rheostat illustrated herewith is particularly adapted to use for controlling the charging rate of rectifiers when required. The standard sizes carried in stock have maximum resistances of 45 ohms or 25 ohms as specified. This type of rheostat can, however, be furnished with other maximum resistances. It is mounted on a block of insulating material and provided with A. R. A. binding posts for connections.

Variable Resistances

FOR USE ON NON-TUNE RECTIFIERS

Terminal Spacing 2⅜" C. to C.



Resistance Complete **Resistance with Shell Removed**

All Non-Tune Rectifiers described in this section, except Type No. 109, are equipped with variable resistances of this type.

Each resistance is of proper value to regulate the charging rate on a battery of a given voltage as designated in the table below.

The resistances may be used on Rectifiers of either the single or half-wave type or of the double or full-wave type.

DESCRIPTION

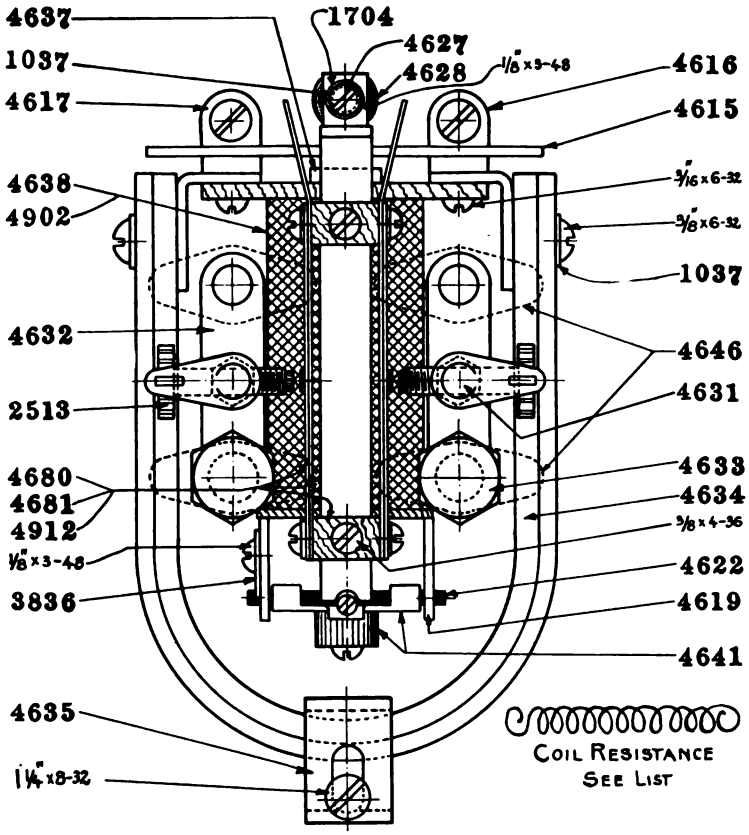
No. 4588. Variable resistance for battery of approximately 2 volts.
No. 4589. Variable resistance for battery of approximately 4 volts.
No. 4590. Variable resistance for battery of approximately 6 volts.
No. 4591. Variable resistance for battery of approximately 8 volts.
No. 4592. Variable resistance for battery of approximately 10 volts.
No. 4593. Variable resistance for battery of approximately 12 volts.
No. 4594. Variable resistance for battery of approximately 14 volts.
No. 4595. Variable resistance for battery of approximately 16 volts.
No. 4596. Variable resistance for battery of approximately 18 volts.
No. 4597. Variable resistance for battery of approximately 20 volts.
No. 4598. Variable resistance for battery of approximately 24 volts.
No. 4599. Variable resistance for battery of approximately 1.2 volts.

Digitized by Google

Non-Tune Rectifier

IMPROVED MOVEMENT (100 TYPE)

Repair Parts



No.	Description
17A.	Condenser.
1037.	Washer.
1704.	Washer.
2513.	Contact screw only.
3836.	Bearing pin clip.
4615.	Vibrating armature, complete.
4616.	Top mounting bracket, R. H.
4617.	Top mounting bracket, L. H.
4619.	Centering armature support bracket.
4622.	Centering armature shaft.
4627.	Armature shaft.
4628.	Base for armature shaft.
4631.	Stationary contact post, complete.
4632.	Contact plate.
4633.	Hexagon head connecting stud.
4634.	Permanent magnet.
4635.	Magnet clamp.
4637.	Laminated core, complete with copper slug.

No.	Description
4638.	Coil for 60 cycle Rectifier movement.
4641.	Centering armature, complete.
4646.	Threaded contact piece (back of panel).
4680.	Vibrating contact unit, complete for Type No. 100 Rectifier (60 cycles).
4681.	Vibrating contact unit, complete for Types above No. 101 (60 cycles).
4902.	Coil for 25 cycle Rectifier movement.
4912.	Vibrating contact unit, complete for 25 cycle Rectifier (specify code number of Rectifier).

Screws

1/8"x3-48 R. H. brass machine screw, nickel plated.
3/16"x6-32 R. H. brass machine screw, nickel plated.
3/8"x4-36 R. H. brass machine screw, nickel plated.
3/8"x6-32 R. H. brass machine screw, nickel plated.
1 1/4"x8-32 R. H. brass machine screw, nickel plated.

Coil Resistance

When ordering, give code number of Rectifier, specify battery voltage and capacity of lighting tap, if any.

Transformers

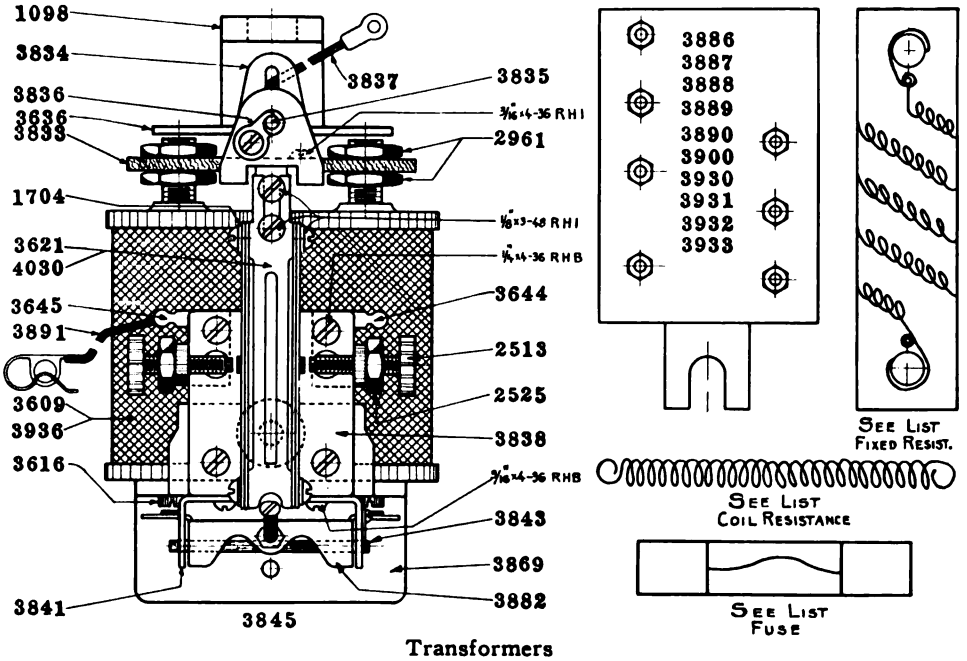
When ordering transformers, specify code number of Rectifier, primary voltage and frequency, voltage of batteries to be charged, voltage and capacity of A. C. tap or taps, if any, and give serial number of Rectifier when possible.

Digitized by Google

Non-Tune Rectifier

OLD TIME MOVEMENT

REPAIR PARTS



Transformers

When ordering transformers, specify code number of Rectifier, primary voltage and frequency, voltage of batteries to be charged, voltage and capacity of A. C. tap or taps, if any, and give serial number of Rectifier when possible.

Coil Resistance

When ordering, give code number of Rectifier, specify battery voltage and capacity of lighting tap, if any.

Fixed Resistance

When ordering, specify as above.

Fuse

Specify 1 ampere for signal battery and 2 amperes for track battery charging circuit.

No.	Description
17-A.	Condenser.
1098.	Permanent magnet.
1704.	Washer.
2513.	Contact screw complete with lock nut.
2525.	Lock nut only for contact screw.
2961.	Hexagon nut for magnet core.
3609.	Coil for 60 cycle Rectifier movement.
3616.	Special filister head screw.
3621.	Vibrating contact unit (for 60 cycle movement).
3636.	Armature and bearing piece complete.
3644.	Contact screw angle right hand.
3645.	Contact screw angle left hand.
3833.	Rectifier unit yoke.
3834.	Armature support.
3835.	Armature shaft.
3836.	Bearing pin clip.
3837.	Flexible connection complete with terminal.
3838.	Contact screw insulating support.
3841.	Centering armature support bracket.
3843.	Centering armature shaft.
3845.	Rectifying movement complete (specify 25 or 60 cycle).
3869.	Rectifier unit supporting bracket.
3882.	Centering armature complete.
3886.	Variable resistance block for 2 volt battery.
3887.	Variable resistance block for 6 volt battery.
3888.	Variable resistance block for 8 volt battery.
3889.	Variable resistance block for 10 volt battery.
3890.	Variable resistance block for 12 volt battery.
3891.	Flexible connection with clip.
3900.	Variable resistance block for 4 volt battery.
3930.	Variable resistance block for 16 volt battery.
3931.	Variable resistance block for 14 volt battery.
3932.	Variable resistance block for 18 volt battery.
3933.	Variable resistance block for 20 volt battery.
3936.	Coil for 25 cycle Rectifier movement.
4030.	Vibrating contact unit (for 25 cycle movement).

Screws

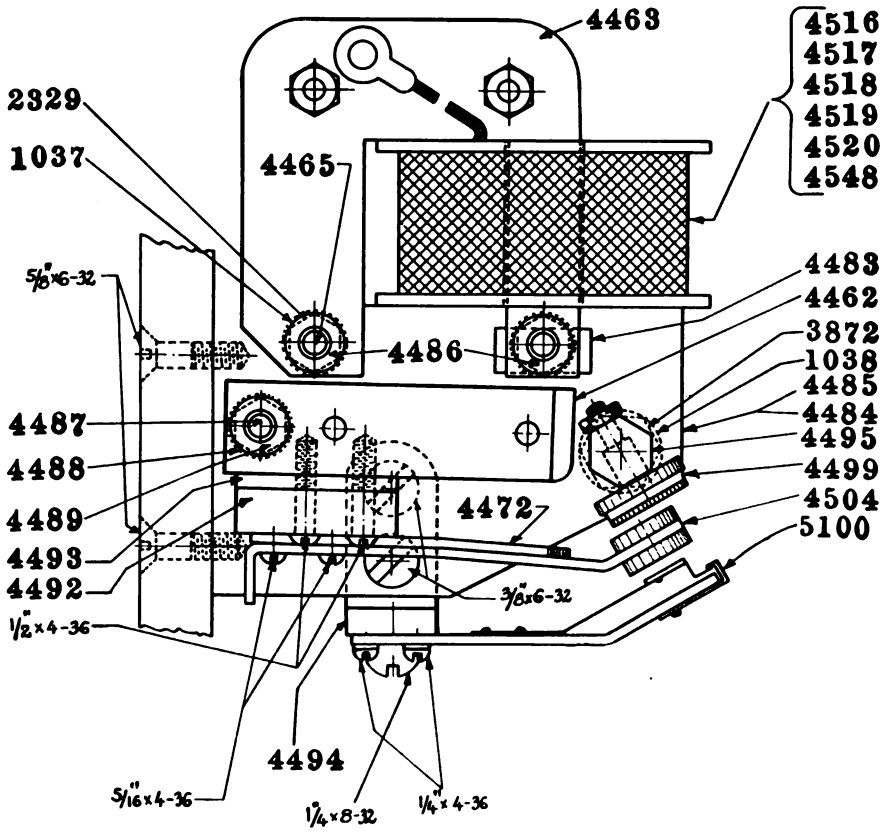
1/8"x3-48 R. H. iron machine screw, nickel plated.
1/16"x4-36 R. H. iron machine screw, nickel plated.
3/16"x4-36 R. H. brass machine screw, nickel plated.
1/4"x4-36 R. H. brass machine screw, nickel plated.

Digitized by Google

Power-Off Relay

IMPROVED TYPE

REPAIR PARTS



No.	Description
1037.	Washer.
1038.	Washer.
2329.	Hexagon nut.
3872.	Hexagon nut.
4462.	Laminated armature complete.
4463.	Laminated field complete.
4465.	Relay through bolt.
4472.	Armature contact spring stop.
4483.	Field copper slug.
4484.	Right side frame.
4485.	Left side frame.
4486.	Frame spacing tubes.
4487.	Armature shaft.
4488.	Armature shaft washer.
4489.	Frame spacing tube.
4492.	Armature contact support.
4493.	Armature contact insulation.
4494.	Back contact spring bracket.
4495.	Front contact supporting stud.
4499.	Front contact.
4504.	Armature contact complete.
4516.	Coil for 6 volts 60 cycle operation.
4517.	Coil for 8 volts 60 cycle operation.
4518.	Coil for 10 volts 60 cycle operation.
4519.	Coil for 12 volts 60 cycle operation.
4520.	Coil for 14 volts 60 cycle operation.
4548.	Coil for 25 volts 60 cycle operation (for all relays mounted on Rectifier).
5100.	Back contact complete.

Screws

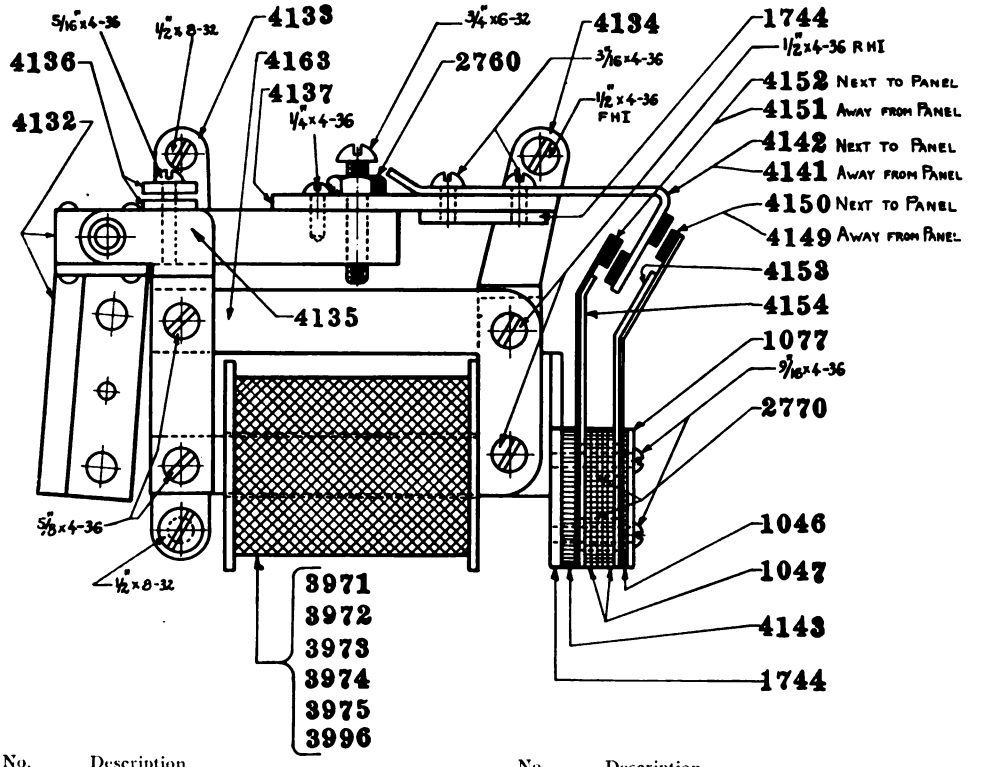
1/4"x4-36 R. H. brass machine screws, nickel plated.
1/4"x8-32 R. H. brass machine screws, nickel plated.
5/16"x4-36 R. H. brass machine screws, nickel plated.
3/8"x6-32 F. H. brass machine screws, nickel plated.
1/2"x4-36 R. H. brass machine screws, nickel plated.
5/8"x6-32 F. H. iron machine screws, nickel plated.

Digitized by Google

Power-Off Relay

OLD TYPE

Repair Parts



No.	Description
1046.	2 hole insulating washer.
1047.	2 hole insulating washer.
1077.	2 hole metal washer.
1744.	2 hole tapped washer.
2760.	Hexagon brass nut.
2770.	Rubber insulating bushing.
3971.	Relay coil for 6 volt operation.
3972.	Relay coil for 8 volt operation.
3973.	Relay coil for 10 volt operation.
3974.	Relay coil for 12 volt operation.
3975.	Relay coil for 14 volt operation.
3996.	Relay coil for all relays mounted on Rectifier.
4132.	Armature, complete.
4133.	Mounting bracket (armature end).

No.	Description
4134.	Mounting bracket (contact end).
4135.	Armature bearing bracket.
4136.	Cord retainer.
4137.	Armature contact support.
4141.	Armature contact (away from panel).
4142.	Armature contact (next to panel).
4143.	Insulating contact spring support.
4149.	Back contact (away from panel).
4150.	Back contact (next to panel).
4151.	Front contact (away from panel).
4152.	Front contact (next to panel).
4153.	Back contact spring stop.
4154.	Front contact spring stop.
4163.	Laminated core, complete with copper slug.

Screws

3/16"x4-36 R. H. iron machine screw, nickel plated.
1/4"x4-36 R. H. iron machine screw, nickel plated.
1/2"x4-36 R. H. iron machine screw, nickel plated.
1/2"x4-36 F. H. iron machine screw, nickel plated.
3/16"x4-36 R. H. iron machine screw, nickel plated.
1/2"x8-32 R. H. iron machine screw, nickel plated.
5/16"x4-36 R. H. iron machine screw, nickel plated.
5/8"x4-36 R. H. iron machine screw, nickel plated.
3/4"x6-32 R. H. brass machine screw, nickel plated.

Digitized by Google

Memoranda

Digitized by Google

Section 9

Contents

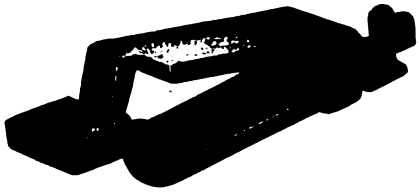
TEST CLIPS

ELECTRICAL TESTING AND MEASURING INSTRUMENTS

Digitized by Google

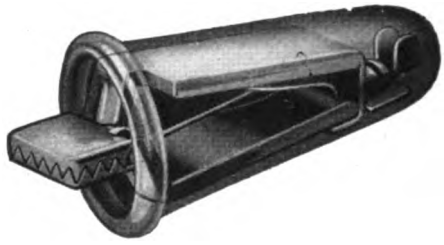
Universal Test Clips

COPPER AND LEAD COATED



No. 27

Actual Size



No. 28

10 AMPERE CAPACITY

Spread of Jaw, $\frac{9}{16}$"—Screw Connection

Especially Designed for Signalmen

Universal Test Clips are time savers in any electrical work requiring quick, temporary connections. Especially well adapted for use by Signal Inspectors, Supervisors and Maintainers in making tests and temporary connections on **Relays, Crossing Bells, Autoflags, Batteries, Track Circuits,** and **All Kinds of Signal** and **Similar Apparatus.**

For use in taking meter readings they have no equal as time savers and they provide a good reliable connection. They can be snapped on to a dirty binding post, corroded battery posts or bond wires and be depended upon to make a good electrical connection. This is made possible by the design of the clip, which is provided with sharp teeth which bite through any dirt or corrosion.

These clips are provided with screw connections for the test leads which feature commends them as being far superior to the types which require the soldering of the leads to the test clip.

Insulators can also be furnished with these clips when desired. These insulators permit tests to be made under wet weather conditions and in close quarters where the bare clip might touch some object which would affect the accuracy of the readings being taken. Insulated clips are always furnished with one-half the quantity fitted with Red insulators and the other half fitted with Black, so that the colors may serve to indicate polarity of leads, when they are used on test sets.

Description

No. 27. Bare Universal Test Clips (10 ampere capacity).

No. 28. Insulated Universal Test Clips (10 ampere capacity).

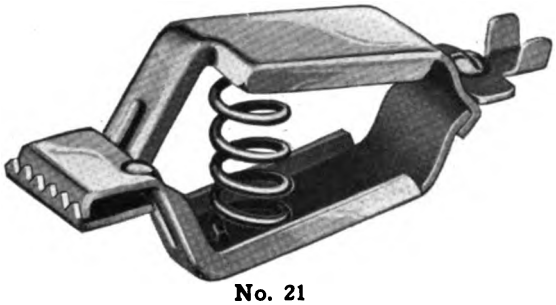
No. 29. Insulator only, for Clip No. 27.

No. 24A. 15 amp. Lead coated Battery Clip.

Digitized by Google

Battery Clips

High Carrying Capacity **Copper or Lead Coated**



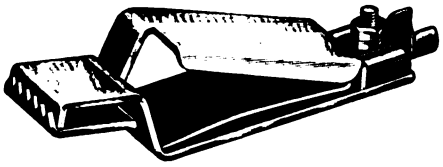
No. 21

Spread of Jaws—1½ Inches **Screw Connection**

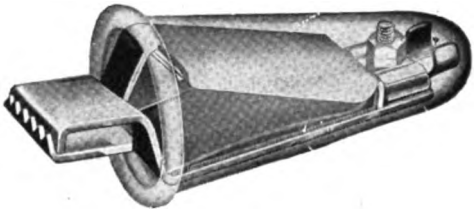
50 AMPERE CAPACITY

Description

No. 21. Bare Universal Test Clip (50 amp. capacity).
No. 22. Insulated Universal Test Clip (50 amp. capacity).
No. 23. Insulator only for No. 21 Clip.



No. 11



No. 12

100 AMPERE CAPACITY
200 AMPERE CAPACITY

Spread of Jaws—1 Inch **Cleat Connection**

Description

No. 11. Bare Universal Test Clip (100 amp. capacity).
No. 12. Insulated Universal Test Clip (100 amp. capacity).
No. 33. Bare Universal Test Clip (200 amp. capacity).
No. 34. Insulated Universal Test Clip (200 amp. capacity).
No. 35. Insulator only for No. 33 Clip.
No. 11A. Lead Coated Battery Clip (100 amp. capacity).
No. 33A. Lead Coated Battery Clip (200 amp. capacity).

25 AMPERE CAPACITY

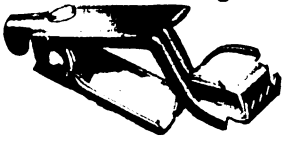
Spread of Jaws—¾ Inch **Screw Connection**

Description

No. 24. Bare Universal Test Clip (25 amp. capacity).
No. 25. Insulated Universal Test Clip (25 amp. capacity).
No. 26. Insulator only for No. 24 Clip.
No. 21A. Lead Coated Battery Clip (35 amp. capacity).

Valley Battery Clip

Acid Resisting



Positive Grip **Screw Connection**

Over all length, 2⅝ inches. Jaws open to take ¾ inch rod. Capacity, 25 amperes.

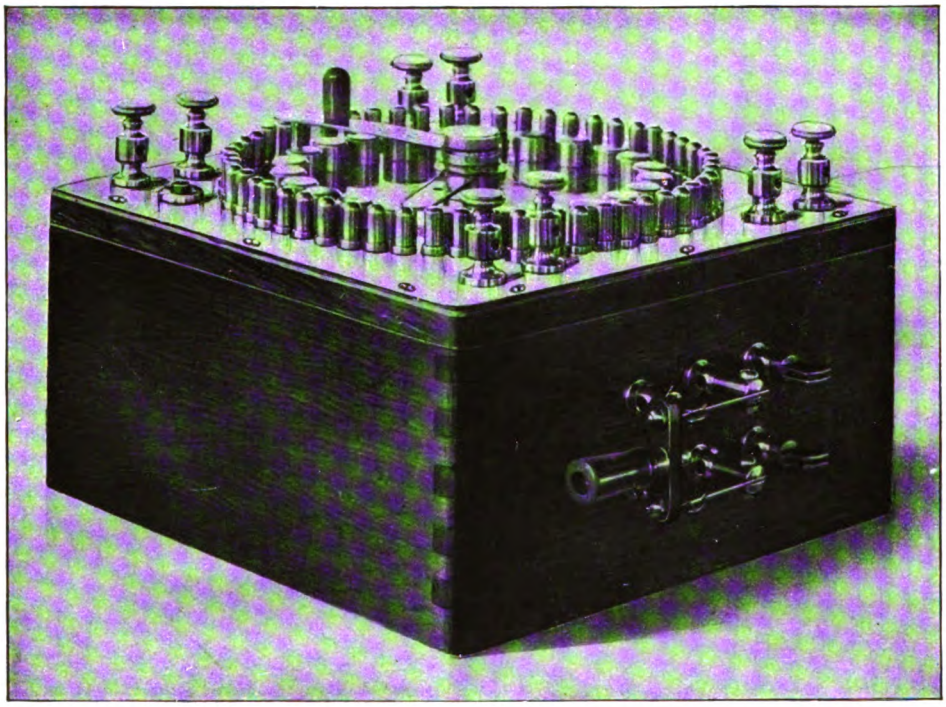
Description

No. 121. Valley Battery Clip.

Digitized by Google

Potentiameter Rheostat No. 4281

LABORATORY TYPE



For testing the operating and releasing current of relays, locks, slots, indicators, etc., this instrument cannot be surpassed. These devices in many cases operate on very small amounts of current and to insure their proper operating characteristics the Potentiameter Rheostat is provided for making the necessary tests. In a range of resistance from 2 to 2,000 ohms this instrument will allow regulations in fractions of a milliampere.

The D. P. D. T. switch will allow tests to be made in connection with polarized circuits and to determine the value or amounts of residual magnetism.

Carrying capacity of windings, 1 ampere continuously or 3 amperes for 30 seconds.

Resistance per step of inside row of contacts, 2.5 ohms.

Resistance per step of outside row of contacts, 1 ohm.

Total resistance of instrument, 150 ohms.

Description

No. 4281. Potentiameter Rheostat.

Digitized by Google

Potentiameter Rheostat Type "L"

POCKET TYPE

Total Resistance, 80 Ohms

Size: 3⅞"x3⅞"x1¾". Weight: 9 ounces

The Type "L" Potentiameter Rheostat is an instrument of precision, designed for the accurate and rapid testing of relays, indicators, slots, etc. It is a high grade instrument which will meet the present day rigid requirements of signal engineers for the accurate and efficient testing and inspecting of signal apparatus.

This testing rheostat combines several features of merit which are at once apparent to anyone using them. The construction is such that it is impossible to burn out the instrument, a condition which heretofore was very liable to occur in potentiameters used for testing signal apparatus.

The resistance is controlled by a contact arm, having a rotary motion, operated by means of a knurled button of insulating material. This makes it possible for the operator to change the resistance with one hand, having the other hand free for other uses.

No live metal parts are touched by the hand, while using this instrument, which might cause an incorrect reading, a condition which could occur during wet weather, if provision were not made to prevent it.

This instrument is inclosed in a substantial, well finished walnut case; the binding posts have non-removable nuts; there are no delicate parts exposed to mechanical injury; and lastly, the measurements and weight evidence that it is a pocket instrument in every sense.

No. 4284. Type "L" Potentiameter Rheostat (80 ohms).

Digitized by Google

Test Rod

POTENTIAMETER RHEOSTAT

No. 4282. Total Resistance, 60 Ohms

This instrument was designed for making rapid and accurate field tests of relays, slots, indicators, etc.

It consists of a resistance rod which is encased in a brass tube. A slide with a positive contact is arranged to make contact with the resistance wire when moved back and forth along the rod. This device is made in a substantial manner, no delicate parts to get out of order and the resistance wire and contact are protected against mechanical injury. When used as a regular potentiameter a very fine regulation of current and voltage is secured.

It can be used as an ordinary series rheostat. Inspectors will find this rod handy and convenient to carry in the pocket, being only 8½ inches long and weighing 12 ounces.

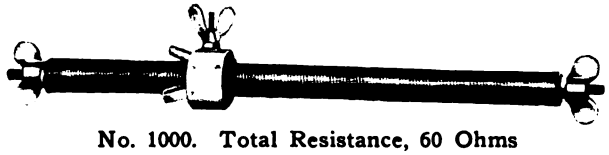
Binding posts are non-removable.

Description

No. 4282. Test Rod, complete (60 ohms).

Digitized by Google

Slide Resistance Stick



No. 1000. Total Resistance, 60 Ohms

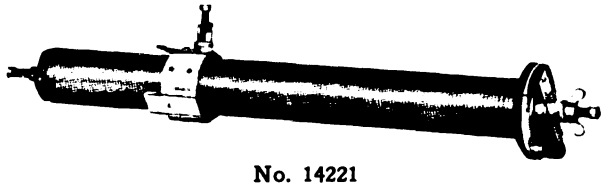
The No. 1000 Slide Resistance Stick is made up for use in finding the "pick up" and "release" of relays or "operating current" and "kick off" of signals. When used with our No. 31 Volt-Ammeter it makes a complete testing outfit for the above work. Standard resistance is 60 ohms. Other resistances to order.

Description

No. 1000. Slide Resistance Stick, complete (60 ohms).
No. 1000-1. Resistance Stick, only (60 ohms).
No. 1001-2. Slider only.

Adjustable Testing Resistance

A. R. A. DRAWING No. 1422



No. 14221

The number 14221 adjustable resistance is well known in the signal field and needs but brief description.

The total resistance is 310 ohms, consisting of two tubes having a resistance of 100 ohms each and a carrying capacity of 400 milliamperes, one tube of 50 ohms resistance having a carrying capacity of 600 milliamperes, and one continuously variable resistance of 60 ohms total resistance. A continuously variable resistance is therefore available up to 310 ohms, which is ample for all practical signal circuit testing.

Description

No. 14221. A. R. A. Adjustable Testing Resistance.

Digitized by Google

Pocket Volt-Ammeter

TYPE "KS"—FOR DIRECT CURRENT

With "Improved Signalman's Scale"

In analyzing the signalman's problem a constructive effort has been made to develop an all purpose testing instrument which will meet the demand for a meter of convenient size, reasonable scale characteristics, durability and accuracy. The Type "KS" Signalman's Volt-ammeter embodies these features and is eminently satisfactory for the general testing of direct current automatic signals, crossing alarms, batteries, relays, track and line circuits and for shop testing.

The instrument is contained in a moulded case of genuine black bakelite which presents a pleasing appearance, is durable and proof against damage by acid. The over all dimensions of the instrument, including binding posts and strap handle, are 5¼x4¾x2 inches.

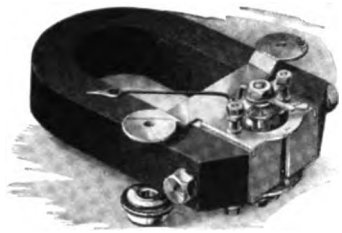
The practicability of the instrument has been increased by placing all binding posts on the top of the case permitting the instrument to be placed in either the vertical or horizontal position as desired. All posts are of moulded bakelite, are provided with square shanks to prevent rotation and have non-removable tops. Engraved markers indicate the scale value of each binding post.

To obtain voltage readings a push button, located on the side of the case, must be pressed and may be turned and locked in position. The location of the push button allows its operation without obstructing visibility.

Digitized by Google

Pocket Volt-Ammeter

TYPE "KS"—(Continued)



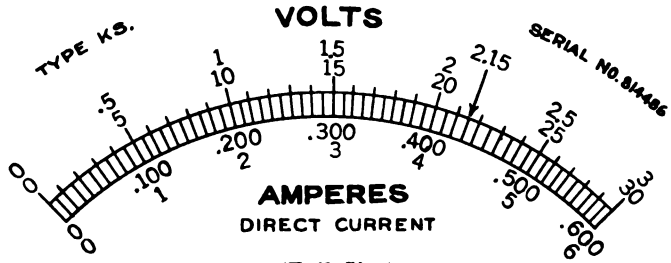
A highly refined D'Arsonval movement is rigidly supported at three points, making the instrument sufficiently rugged to withstand the rigorous service encountered.

The knife edge pointer enables the user to make accurate measurements on the open, 60 division scale which is 3⅛ inches in length.

A zero adjuster is provided to reset the pointer on zero should overload or other accident displace it slightly.

THE IMPROVED SIGNALMAN'S SCALE

The ranges selected for the Improved Signalman's Scale, a full sized reproduction of which is shown, permit the measurement of the current or voltage of almost any signaling circuit.



(Full Size)

SCALE ANALYSIS

60 Divisions

0-.600 Amperes—10 milliamperes per division, major divisions at 100, 200, 300, 400 500 and 600 milliamperes.

0-6 Amperes—0.1 ampere (100 milliamperes) per division, major divisions at 1, 2, 3, 4, 5 and 6 amperes.

0-30 Volts—0.5 volt per division, major divisions at 5, 10, 15, 20, 25 and 30 volts.

0-3 Volts—0.05 volt (50 millivolts) per division, major divisions at 0.5, 1, 1.5, 2, 2.5 and 3 volts, with arrow at 2.15 volts to facilitate testing individual cells of lead storage battery on floating charge.

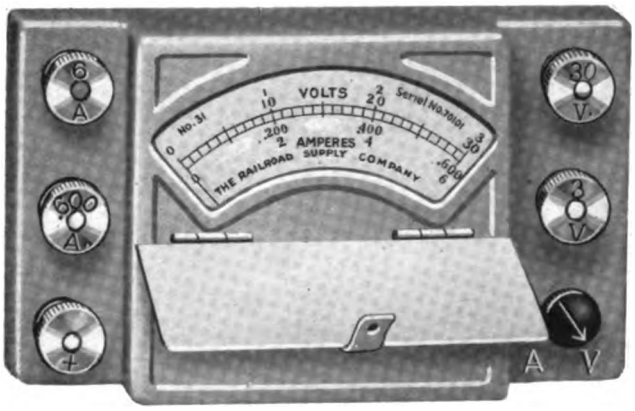
Description

Type K.S. Pocket Volt-Ammeter with improved Signalman's Scale.

Digitized by Google

No. 31 Inspection Volt-Ammeter

FOR DIRECT CURRENT



The No. 31 Volt-ammeter is guaranteed accurate and reliable for direct current service; was especially designed to meet the requirements for a small rugged instrument for maintainers' and inspectors' use.

It is of the d'Arsonval, dead-beat type with jewel bearings, and each instrument calibrated individually. Enclosed in a one piece cast aluminum case, with weather-proof glass dial face protected by hinged snap cover. This type of construction obviates the necessity of separate carrying case. Binding posts are locked so as not to jar loose—with nuts so arranged that they cannot be taken clear off and lost, yet room enough on post to take a No. 6 wire; all parts securely fastened and locked to prevent loosening from vibration; current carrying parts properly insulated. Instrument can be left in circuit without injury.

This meter weighs 19 ounces and on account of its small size, 4¼"x1¼"x2½", can be carried in the pocket, or it may be carried in the tool bag without injury.

It is furnished in a variety of scales as shown by list of readings given below. Scale B or J is recommended for general use, though special scales may be furnished as specified. Thumb switch provides ready means of changing from voltage scale to amperage or vice versa. Instruments furnished with but one or two scales when desired.

STANDARD SCALE

	Volts	Amperes
A	0— 4, 0— 40	0—.400, 0— 4
B	0— 3, 0— 30	0—.300, 0— 3
C	0— 1.5, 0— 15	0—.300, 0— 3
D	0— 5, 0— 50	0—.500, 0— 5
E	0— 3, 0— 30	0— 3. 0—30
F	0— 6, 0— 60	0— 3, 0—30
G	0—10, 0—100	0— 5, 0—50
H	0— 3, 0—150	0— 3, 0—30
I	0— 3, 0— 30	0—.300, 0—15
J	0— 3, 0— 30	0—.600, 0— 6

Description

No. 31. Inspection Volt-Ammeter (specify scale values).

Digitized by Google

Signalman's Portable Volt-Ammeter

TYPE "B. J." FOR DIRECT CURRENT

Size, 9¾x7x3⅝ Inches

Accuracy, ¼ of 1% of Full Scale Value

Two Meters in One

To provide a complete direct current testing instrument for signal work we have designed the Type "B. J." Signalman's Portable Volt-Ammeter.

Two separate D'Arsonval movements of the highest grade together with all shunts and resistances are contained within the beautifully finished **acid proof case.** The front panel of the instrument is of one piece moulded black bakelite.

The scales are hand drawn 3⅞ inches long of 60 or 75 divisions as required by the ranges. They are uniform throughout their length and the indications are very dead beat.

A guarantee card is secured in the cover of each instrument which gives the resistance of the various voltage coils and current shunts so that the values are available when the user wishes to make computations. The resistance of these instruments is not less than 80 ohms per volt.

The voltmeter has four scale ranges and the ammeter has three scale ranges. Any scale combination desired may be furnished, providing all the values of one scale are adaptable to a scale of the same number of divisions. The maximums available, with self contained shunts and resistances are 150 amperes and 150 volts.

The values most frequently ordered are as follows:

0 to 1.5 volts	0 to .150 amperes
0 to 3 volts	0 to 3 amperes
0 to 30 volts	0 to 30 amperes
0 to 150 volts	

A push button is provided, which when pressed, shunts out the milliampere scale. This feature will be found of great advantage and a protection against burning out of the low scale shunt. When connecting the instrument in a circuit to measure current approximating the full value of the low scale the push button may be pressed, turned and locked in position to put the current through the intermediate scale until it has been observed on the intermediate scale that the current is of a value less than the full scale value of the low scale at which time the button may be released to make accurate measurements on the low scale.

Another advantage of this instrument lies where simultaneous readings of current and voltage are desired. The scales are adjacent so that both pointers may be observed at the same time.

Terminals are of the insulated type for voltage ranges, fastened in place to prevent rotation. Current terminals are of nickel plated brass. The terminal nuts are non-removable.

OTHER SCALE VALUES AVAILABLE

60 DIVISION SCALE		75 DIVISION SCALE	
Full Scale Values	**Values Per Division**	**Full Scale Values**	**Values Per Division**
.060	.001	.075	.001
.150	.0025	.150	.002
.300	.005	.750	.01
.600	.01	1.5	.02
1.5	.025	7.5	.1
3.	.05	15.	.2
6.	.1	75.	1.
15.	.25	150.	2.
30.	.5		
60.	1.		
150.	2.5		

If scale values other than those shown are desired or special requirements must be met, kindly communicate with us.

Description

Type "B. J." Signalman's Portable Volt-Ammeter (specify scales).

Leather carrying case for above furnished when specified.

Digitized by Google

Jewell Multiplex Pocket Volt-Ammeter

PATTERN No. 41—FOR DIRECT CURRENT

Resistance Per Volt Not Less Than 80 Ohms

Accuracy, 1% of Full Scale Value

Pattern No. 41 Voltmeters, ammeters, and volt-ammeters are furnished in black enameled cases 4¾ by 4¾ by 1¼ inches. Provision is made for as many as three voltage and three amperage scales with a wide range of scale combinations available.

Binding posts have square shanks, are fitted with non-removable nuts and are plainly marked to indicate the scale to which each corresponds.

Instruments are furnished with internal shunts and resistances up to and including 60 amperes and 150 volts above which values external shunts and resistors are furnished.

The instrument can be furnished with any number of scales up to 3 voltage and 3 current ranges. For signal testing purposes the 6 range instrument is recommended, unless the limited use to which the meter is to be put does not warrant the multiple scale instrument.

When the low range voltage scale is of a full scale value to permit the addition, an arrow is placed at the 2.15 volts point to facilitate checking voltages of individual storage cells on floating charge.

A push button, of the locking type, in the lower left hand corner must be pressed when taking voltage readings.

To reduce the possibilities of burning out the low current scale a novel scheme has been incorporated in this instrument. When making readings, which are believed to be within the range of the low current scale, connections are made to the intermediate scale and after it has been noted that the current draw is such that it can be safely switched to the low scale, the right hand push button may be pressed, which will place the reading on the lower scale for accurate measurement. The button is of the locking type so that the instrument may be left connected to the low current scale when desired.

For convenience a red line is placed on the intermediate scale at a point equal to the full scale value of the low scale, so it may readily be determined if the current being measured can safely be carried by the low scale.

This arrangement will be found exceptionally convenient, as it eliminates shifting of wire from one post to another and the change from intermediate to low scale is made without opening the circuit.

This feature will be found very useful in taking operating and holding current readings on semaphore signals, but in measuring slot release precautions must be taken against burning out of the meter, by operating current, when slot releases.

STANDARD SIX RANGE SCALE COMBINATIONS

Volts	Amperes	Scale Division	List Price
L—0-1.5-3-30	0-.150-3-30	30	$42.75
M—0-1.5-15-30	0-.150-1.5-15	75	42.75
N—0-1.5-15-150	0-.150-3-30	30	42.75
O—0-1.5-15-150	0-1.5-3-30	30	42.75
P—0-3-15-150	0-.150-1.5-15	30	42.75
Q—0-3-15-150	0-.300-3-15	30	42.75
R—0-3-30-150	0-.300-3-30	30	42.75
S—0-3-15-150	0-3-15-30	30	42.75
T—0-1.5-15-150	0-.150-15-150*	75	48.25
U—0-3-15-150	0-.300-15-150*	30	48.25
V—0-3-30-150	0-3-30-60	30	42.75

Other scale combinations can be furnished to meet requirements.

*External shunt furnished for 150 ampere range.

Digitized by Google

Jewell Utility Portable Voltmeter or Ammeter

PATTERN No. 2 FOR DIRECT CURRENT
PATTERN No. 11 FOR ALTERNATING CURRENT

Size, 8¾x7⅛x4¼ Inches

Accuracy, ¼ of 1% of Full Scale Value

Pattern No. 2 and Pattern No. 11 portable instruments have been on the market for a number of years and have found favor among those wishing ruggedness and reliability in an accurate, portable instrument for general testing purposes.

The scale is 6¾ inches long, hand drawn on white bristol board with a mirror to eliminate errors due to parallax. A knife edge pointer enables the user to take accurate readings.

All movements are carefully aged to make certain their characteristics will be stable and that the accuracy will be maintained throughout the life of the instrument.

All instruments listed below are self-contained, except direct current ammeters reading above 75 amperes full scale which are provided with external shunts.

PRICE LIST AND SCALE RANGES AVAILABLE

Single Range Instruments

Range Volts	Scale Divisions	No. 2 D. C.	No. 11 A. C.	Range Milliamps.	Scale Divisions	No. 2 D. C.	No. 11 A. C.
.3-0-3	150	$43.25	.....	1	100	$50.00	.....
3	150	43.25	.....	3	150	43.25	.....
15	150	43.25	$36.00	5	100	43.25	.....
75	150	43.25	36.00	15	150	43.25	.....
150	150	43.25	36.00	150	150	43.25	.....
300	150	45.25	40.50	300	150	43.25	.....
500	100	47.25	44.50	500	100	43.25	.....
600	120	48.25	45.50	Amperes			
750	150	49.75	47.50	1	100	$43.25	$36.00
Millivolts				5	100	43.25	36.00
25	125	43.25	.....	15	150	43.25	36.00
50	100	43.25	.....	30	150	43.25	36.00
75	150	43.25	.....	50	100	43.25	36.00
100	100	43.25	.....	75	150	43.25	36.00
150	150	43.25	.....	100	100	48.75	38.00
Microamps.				150	150	48.75	40.00
100	100	65.00	.....	200	100	49.75	42.00
200	100	65.00	.....	300	150	51.75	44.00
500	100	55.00	.....	400	80	53.75	45.00
				500	100	55.75	46.00

MULTIPLE RANGE VOLTMETERS

Double Range

Ranges, Volts	Scale Divisions	No. 2 A. C.	No. 11 A. C.
3- 30	150	$45.25	.....
15-150	150	45.25	.....
150-300	150	48.25	$43.50
300-600	150	51.25	48.50

Triple Range

3- 15-150	150	47.25	.....
15- 30-150	150	47.25	.....
15-150-300	150	50.25	.....
150-300-600	150	53.25	50.50

Four Range

3- 15- 75-150	150	49.25	.....
3- 15-150-300	150	52.25	.....
3-150-300-750	150	56.75	.....

Digitized by Google

Jewell Portable Voltmeter or Ammeter

PATTERN No. 43 FOR D. C.

PATTERN No. 45 FOR A. C.

The case of this instrument is moulded black bakelite, 4 1/16"x4 3/8"x2" with strong leather carrying strap.

The movement used in the direct current instruments is extremely light in weight with the result that it will stand considerable rough handling without showing evidence of friction. The alternating current instrument also has a light weight movement and will give excellent service under difficult conditions.

Pointers are of the knife edge type and the scales have fine lines so that the relative accuracy of the instrument is quite high. A zero correction device is provided to allow resetting on zero should rough handling or overload displace the pointer slightly.

Direct current voltmeters have a resistance of not less than 80 ohms per volt and the ammeters a drop of about 75 millivolts. Voltmeters are furnished self-contained up to and including 300 volts, above which figure external resistors are supplied. Ammeters are furnished self-contained up to and including 60 amperes, above which external shunts are furnished.

Alternating current instruments are of the moving iron type and have a loss of less than one watt in the case of ammeters. Voltmeters draw varying currents, depending on their ranges, the 15 volt instrument, for instance, drawing 75 milliamperes and the 150 volt instrument drawing 40 milliamperes. Voltmeters over 300 volts are supplied with external resistors.

PRICE LIST AND AVAILABLE SCALE RANGES

Single Scale

Range, Volts	No. of Scale Divisions	List Prices No. 43 D. C.	No. 45 A. C.
3	60	$20.00	.....
7.5	75	20.00	.....
10	50	20.00	$20.00
15	75	20.00	20.00
30	30	20.00	20.00
50	50	20.00	20.00
75	75	20.00	20.00
150	75	20.00	20.00
300	75	23.00	23.00

Double Scale

0-3- 15	75	$23.00	.....
0-3- 30	30	23.00	.....
0-3-150	75	24.00	.....

Double Scale

Ranges, Volts	No. of Scale Divisions	List Prices No. 43 D. C.	No. 45 A. C.
0- 10- 50	50	$23.00	.....
0- 8- 80	40	23.00	.....
0- 10-100	50	24.00	.....
0- 12-120	60	24.00	.....
0-150-300	75	26.00	$26.00

Single Scale

Amperes			
1	50	$20.00	$20.00
5	50	20.00	20.00
10	50	20.00	20.00
15	75	20.00	20.00
20	40	20.00	20.00
30	30	20.00	20.00
50	50	20.00	20.00
60	60	20.00	20.00

Special scale values and combinations can usually be furnished to meet requirements. Should values other than those listed above be desired, kindly communicate with our nearest office.

Digitized by Google

Jewell Pattern 79 Voltmeter

FOR ALTERNATING CURRENT

The application of alternating current to railway signaling and train control devices necessitates the use of measuring instruments which vary in construction from the usual A. C. meter. It is obviously impossible to obtain satisfactory results in measuring the voltage of circuits containing devices which normally operate on less than one watt with a meter which, for full scale deflection, requires one watt or more.

To meet the demand for a sensitive A. C. voltmeter for measurements where low current values are involved the pattern No. 79 has been designed. This instrument gives full scale deflection on far less than the energy required by a standard A. C. meter. With the modified iron cored dynamometer type of movement used in this instrument, exceptionally low voltages may be measured, while the current draw will be only about 50 milliamperes. Even lower current draw is possible if the low scale is at 1.5 volts or above. For some classes of work, extremely low current draw is essential and if the order so specifies and the lowest scale required is 1.5 volts or higher, the instrument will be furnished with a current draw of about 20 milliamperes. Always definitely specify when low milliampere draw is required.

The instrument is encased in moulded black bakelite and has case dimensions of $4\frac{5}{16}$"x$4\frac{3}{8}$"x2". Durability, freedom from damage by acid and pleasing appearance are assured by the genuine bakelite case.

Instruments are normally calibrated for use on 60 cycle circuits unless other frequencies are definitely specified when ordering. While many scale combinations are possible, those listed below will be found to meet most requirements. Should special scale combinations or values be required, kindly communicate with our nearest office.

PRICE LIST AND AVAILABLE SCALE COMBINATIONS

50 Milliampere Maximum Current Draw

Triple Range			Four Range		
Volts	Scale Division	List Price	Volts	Scale Division	List Price
0-1-5-25	50	$75.00	0-1-5-25-125	50	$80.00
0-1-5-50	50	75.00	0-1-10-25-100	50	80.00
0-1-10-25	50	75.00	0-1.5-7.5-37.5-150	75	80.00
0-1-10-50	50	75.00			
0-3-15-30	60	75.00			
0-3-30-150	60	80.00			
0-5-25-125	50	80.00			

20 Milliampere Maximum Current Draw

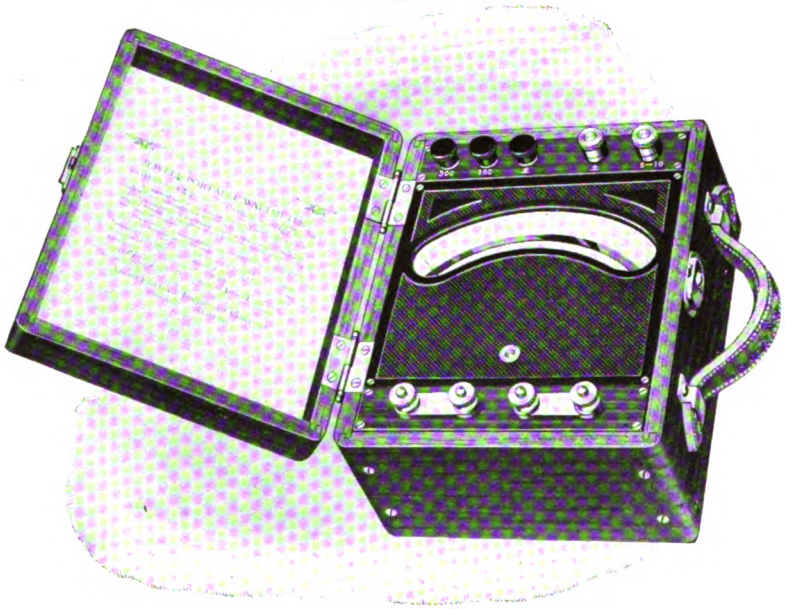
Triple Range			Four Range		
Volts	Scale Division	List Price	Volts	Scale Division	List Price
0-1.6-8-40	80	$85.00	0-1.6-16-80-160	80	$95.00
0-1.6-40-160	80	90.00	0-1.6-16-40-160	80	95.00
0-1.6-16-40	80	85.00	0-1.6-8-80-160	80	95.00
0-1.6-16-160	80	90.00	0-1.6-8-40-160	80	95.00
0-3-15-30	60	85.00	0-1.6-8-16-80	80	90.00
0-5-25-125	50	90.00	0-1.6-8-40-80	80	90.00

Digitized by Google

Jewell Dynamometer Portable Wattmeter

PATTERN No. 8

For D. C. or Single Phase A. C.



Accuracy, 1/5 of 1% of Full Scale Value
Size, 9¾x7⅞x5¾ Inches

A standard dynamometer movement is used in this instrument. All portable wattmeters have two current capacities and two voltage capacities, giving the instrument a wide range of usefulness. The two current ranges are obtained by cross connecting the current coils with links shown at the bottom of the instrument. Both the moving and the stationary coils are designed to carry an overload of 50%, thereby allowing the measurement of energy under conditions of low power factor where a high current may be drawn. The scale of this instrument is equipped with a mirror and is remarkably uniform throughout its length of 6¾ inches.

PRICE LIST AND AVAILABLE SCALE RANGES

Watts, Range		Amperes			Scale	List
Series	Multiple	Series	Multiple	Volts	Divisions	Price
150	300			150		
300	600	1	2	300	150	$105.00
750	1500			150		
1500	3000	5	10	300	150	105.00
1500	3000			150		
3000	6000	10	20	300	150	105.00
3000	6000			150		
6000	12000	20	40	300	150	110.00
7500	15000			150		
15000	30000	50	100	300	150	115.00
300	600			300		
600	1200	1	2	600	150	118.00
1500	3000			300		
3000	6000	5	10	600	150	118.00
3000	6000			300		
6000	12000	10	20	600	150	120.00
6000	12000			300		
12000	24000	20	40	600	150	122.00
15000	30000			300		
30000	60000	50	100	600	150	127.00

NOTE—This dynamometer instrument is also made as a voltmeter, ammeter and milliammeter. Prices and data on application.

Special low range wattmeters can be furnished and if desired should be made the subject of correspondence with our nearest office.

Digitized by Google

Ammeters—Indicating Instruments

PATTERN 33 AMMETER

The pattern 33 Ammeter illustrated herewith is a very accurate high grade instrument having a very dead beat D'Arsonval movement. When used in connection with a rectifier, it not only serves to show whether the rectifier is charging or not, but also gives an accurate reading of the charging current.

It is a standard 3″ switchboard instrument mounted on a block of insulating material provided with A. R. A. binding posts, for connections.

Instruments with 0 to 1 ampere scales should be connected in the charging circuit only and should not be subject to reverse currents unnecessarily. Instruments with center zero and 3 or 5 ampere range with 3-0-3 or 5-0-5 scales are carried in stock in addition to those having 0-1 ampere scale.

Instruments of other scale values up to 40 amperes will be furnished to order.

Description

No. 33. Mounted Ammeter, specify scale value.

PATTERN 82 INDICATING INSTRUMENT

The pattern 82 Indicating instrument is a 2″ ammeter, similar to those used on automobile dash boards and is provided with a fairly accurate vane type movement.

It is mounted in a block of insulating material provided with A. R. A. binding posts for connections and has a normally closed push button mounted between the binding posts, which shunts out the instrument, except when the button is depressed to take a reading.

The scale has a center zero and indicates both charge and discharge. The instrument carried in stock has a scale value of approximately 1 ampere, thus serving not only as a charge and discharge indicator, but also giving an approximate reading of the current flow. Other scale values up to 40 amperes will be furnished to order.

This indicator is satisfactory in most installations where an accurate reading can be taken from time to time with the meter usually carried by maintenance forces.

Description

No. 82. Mounted indicating instrument, specify scale value.

Digitized by Google

Jewell Pattern 84 D. C. Voltmeter

This instrument is of the magnetic vane type and is supplied with a small cord and prod for battery testing and other measurements within its range of 50 volts.

Current consumed by the instrument is extremely low for this class of meter.

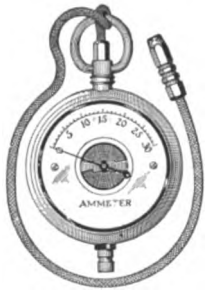
		List Price
Pattern No. 84.	Range, 0-50 volts	$2.75

Jewell Pattern 85 D. C. Ammeter

This instrument is of the magnetic vane type specially designed for taking flash tests of dry cells. It is of the two inch switch board type with two prods so spaced as to fit the standard spacing of binding posts on No. 6 dry cells. This arrangement facilitates readings to be taken on the 40 ampere scale.

		List Price
Pattern No. 85.	Range, 0-40 amperes	$2.00

Watch Case Ammeter



This ammeter is accurate, sturdy and of proven reliability.

It is used by Telephone, Telegraph and Railroad companies for battery testing and other purposes.

It will operate on either A. C. or D. C. and indicates in either direction of current regardless of polarity of terminals.

Made in two ranges.

		List Price
No. 30.	Range, 0-30 amperes	$2.00
No. 50.	Range, 0-50 amperes	2.00

Digitized by Google

Weston Model 45 Portable D. C. Instruments

Size, 8x8x4¾ Inches

Accuracy, ½ of 1% of Full Scale Value

The movement is of the permanent magnet movable coil type inclosed in an iron case to protect it against the effects of external fields.

A zero correction device is provided and the knife edge pointer over a mirror backed scale permits of easy and accurate readings.

Instruments are incased in a wooden carrying box with strap handle and hinged cover.

We list below only single range voltmeters, ammeters and milliammeters. Double and triple range meters with scale combinations as shown for Model 1 Instruments on page 265. To determine the price of such instruments, add $7.50 for each additional range to the price listed for the highest range.

PRICE LIST AND AVAILABLE RANGES

Single Range Voltmeters

Range, Volts	Scale Divisions	Price Each	Range Volts	Scale Divisions	Price Each
0.2-0-2.8	150	$41.25	150	150	$48.75
3	150	41.25	300	150	53.75
5	100	41.25	600	120	57.75
15	150	41.25	750	150	61.00

Single Range Ammeters

Range, Amperes	Scale Divisions	Price Each	Range Amperes	Scale Divisions	Price Each
1.5	150	$41.25	100	100	$43.75
3	150	41.25	150	150	44.50
5	100	41.25	200	100	46.25
10	100	41.25	300	150	46.75
15	150	41.25	500	100	48.75
50	100	42.00	750	150	52.00

Single Range Milliammeters

Range, Milliamperes	Scale Divisions	Price Each	Range Milliamperes	Scale Divisions	Price Each
1.5	150	$49.50	100	100	$41.25
15	150	41.25	150	150	41.25
30	150	41.25	300	150	41.25
75	150	41.25	750	150	41.25

Weston Model 432 Portable Wattmeters

For D. C. and Single Phase A. C.

Size, 6 13/32x5¼x3½ Inches

Accuracy, 1% of Full Scale Value

This is an electrodynamometer instrument having electrically independent potential and current circuits.

Standard normal current ranges from 1 ampere up to and including 50 amperes. All the listed ranges are self-contained.

Normal Volts	Amperes Nor.	Amperes Max.	Watts Low	Watts High	Price Each
75-150	1	1.5	75	150	$50.00
50-300	1	1.5	150	300	57.50
75-150	2	3	150	300	50.00
150-300	2	3	300	600	57.50
75-150	5	7.5	375	750	50.00
150-300	5	7.5	.75KW	1.5KW	57.50
75-150	10	15	1.5KW	3KW	62.50
150-300	10	15	1.5KW	3KW	55.00
75-150	20	30	3KW	6KW	62.50
150-300	20	30	3.75KW	7.5KW	60.00
75-150	50	75	7.5KW	15KW	67.50
150-300	50	75			

Digitized by Google

Weston Model 155 Portable Instruments

VOLTMETERS—AMMETERS—MILLIAMMETERS

For Alternating Current

Accuracy, ½ of 1% of Full Scale Value

Sizes: Up to 300 amps. or 300 volts—7x7⅛x3¼ inches—wt., 4 pounds.
Above 300 amps. or 300 volts—7¾x8¼x4 inches—wt., 5 pounds.

Model 155 instruments are equipped with movable iron type movements, have zero correction devices and knife edge pointers over mirror backed scales, 5¼ inches in length.

An improved air-damper device renders the movement practically dead-beat. The instruments are extremely responsive to small or rapid changes of current strength or potential difference of the circuit to which they may be connected.

Voltmeters having ranges of 125 volts or higher require 75 milliamperes to produce full scale deflection. Lower ranges require a greater current, the value of which depends on the range.

Ammeters may be used in circuits of 2300 volts potential.

PRICE LIST AND AVAILABLE SCALE RANGES

Single Range Voltmeters

Range, Volts	Scale Divisions	Price Each	Range, Volts	Scale Divisions	Price Each
30	150	$33.75	250	125	$40.50
50	100	33.75	300	150	40.50
75	150	33.75	500	100	47.00
125	125	33.75	600	120	48.75
150	150	34.50	750	150	52.75

Double Range Voltmeters

150- 75	150	$42.00	600-150	150	$56.26
300-150	150	48.00	750-300	150	60.25
600-300	150	56.25	750-150	150	60.25

Triple Range Voltmeters

600-300-150	150	$63.75	750-300-150	150	$67.75

Single Range Milliammeters

Scale values of 75, 150, 250, 500 or 750 milliamperes as specified. List price.....$32.75

Single Range Ammeters

Range, Amperes	Scale Divisions	Price Each	Range, Amperes	Scale Divisions	Price Each
1	100	$32.75	75	150	$32.25
2	100	32.75	100	100	32.25
3	150	31.25	150	150	33.00
5	100	31.25	200	100	33.75
10	100	31.25	250	125	34.50
15	150	31.25	300	150	34.75
25	125	31.25	400	80	38.00
50	100	32.25	500	100	41.25

Double Range Ammeters

5-2.5	100	$48.75	10-5	100	$48.75

Digitized by Google

Weston Model 1 Portable Instruments

FOR DIRECT CURRENT

Accuracy, ¼ of 1% of Full Scale Value

VOLTMETERS—AMMETERS—VOLT-AMMETERS

Recommended for Accurate Testing and Precision Work

These instruments are supplied in numerous ranges to meet nearly every requirement for accurate testing in the various branches of the railroad field.

They are all equipped with hardwood carrying cases, have zero adjusters, mirror backed scales and plainly marked, non-removable binding posts. The construction effectively shields the movements.

A certificate accompanies each instrument which gives all the data concerning resistances of the internal voltage coils and current shunts.

The voltmeters are equipped with self-contained resistors up to and including 750 volt range.

Ammeters have self-contained shunts up to and including 500 ampere range.

PRICE LISTS AND AVAILABLE RANGES

Size, 6¾x6x4 Inches. Resistance Per Volt, 100 Ohms

Voltmeters

Single Range

Voltage Range	Scale Divisions	Price Each
3	150	$72.00
15	150	72.00
50	100	72.00
75	150	72.00
150	150	72.00
250	125	81.25
300	150	81.25
500	100	81.25
600	120	81.25
750	150	87.50

Double Range

Voltage Ranges	Scale Divisions	Price Each
3- 15	150	$82.00
3-150	150	82.00
15-150	150	82.00
75-150	150	91.25
250-500	125	91.25
150-600	150	91.25
300-600	150	91.25
150-750	150	97.50

Triple Range

Voltage Ranges	Scale Divisions	Price Each
3- 15-150	150	$ 92.00
3-150-300	150	101.25
150-300-750	150	107.50

Ammeters

Made Regularly with Single Range Only

Size up to 150 amperes, 6¾x6x3¼ inches

Ampere Range	Scale Divisions	Price Each
1	100	$68.75
3	150	75.00
1.5	150	68.75
5	100	81.25
10	100	81.25
15	150	$81.25
25	125	81.25
50	100	81.25
100	100	87.75
150	150	93.75

Size above 150 amperes, 6¾x8½x3¼ inches

Ampere Range	Scale Divisions	Price Each
200	100	$100.00
300	150	100.00
400	80	112.50
500	100	112.50

Higher Ranges can be obtained by using a Millivoltmeter with portable precision shunts

Voltammeters

Range, Volts	Range, Amperes	Scale Divisions	Price, Each
150	1.5	150	$93.75
150	3	150	93.75

Voltammeters of other Ranges made on special order.

Millivoltmeters

Single Scale

Range, Millivolts	Scale Divisions	Price Each
10-0-10	100	$62.50

Double Scale

Range, Millivolts	Scale Divisions	Price Each
10-0-10 and 100-0-100	100	$68.75
20-200	100	68.75

The millivoltmeters listed may be arranged for use with portable precision shunts for current measurements at an additional cost of $6.25.

Milliammeters of Single or Double Range are available in a variety of scale ranges to suit most every testing requirement.

Prices and other information furnished on request.

Digitized by Google

Weston Model 433 Portable Instruments

FOR ALTERNATING CURRENT

Size, 5 1/16 x 6 1/32 x 3 1/2 Inches

Accuracy, 1/2 of 1% of Full Scale Value

These instruments have a sensitive and dead beat move of the movable iron type. A knife edge pointer over a mirror backed scale 3.8 inches long provides for easy and accurate readings. The movement is shielded against the effects of external fields. A zero correction device is provided.

Made in single and double range voltmeters and ammeters and single range milliammeters.

Voltmeters for use on 25 to 133 cycles.

Ammeters and milliammeters for use on 25 to 500 cycles. Higher voltage ranges than those listed can be obtained by using Resistor Multipliers. Prices and data on application.

PRICE LIST AND SCALE RANGES AVAILABLE

Single Range Voltmeters

Range, Volts	Resistance Ohms	Scale Divisions	Price Each	Range, Volts	Resistance Ohms	Scale Divisions	Price Each
10	68	100	$30.00	100	3030	100	$30.00
15	144	150	30.00	125	3800	100	30.00
30	366	60	30.00	150	4550	150	30.00
50	990	100	30.00	250	15600	50	32.50
75	2270	75	30.00	300	18750	60	32.50

Double Range Voltmeters

Ranges, Volts	Resistance Ohms	Scale Divisions	Price Each	Ranges, Volts	Resistance Ohms	Scale Divisions	Price Each
20-10	136—68	100	$37.50	150- 75	4550—2275	150	$37.50
30-15	288—144	150	37.50	300-150	18750—9375	150	39.00
60-30	732—366	60	37.50				

Triple Range Voltmeter

Ranges, 450, 300, 150—Resistances, 28125, 18750 and 9375—Divisions, 150.....$49.00

Single Range Ammeters

Range, Amperes	Scale Divisions	Price Each	Range, Amperes	Scale Divisions	Price Each
1	100	$28.00	10	100	$28.00
1.5	150	28.00	15	150	28.00
2	100	28.00	25	50	28.00
3	60	28.00	30	60	28.00
5	100	28.00	50	100	28.00
7.5	75	28.00			

Double Range Ammeters

2-1	100	$40.00	10-5	50	$40.00
5-2.5	50	40.00	20-10	100	40.00

Single Range Milliammeters

Range, Milliamps.	Resistance Ohms	Scale Divisions	Price Each	Range, Milliamps.	Resistance Ohms	Scale Divisions	Price Each
*30	460	60	$28.00	250	13	50	$28.00
75	211	75	28.00	300	8.75	60	28.00
100	123	100	28.00	500	3.85	100	28.00
150	41	150	28.00	750	2	75	28.00
200	30	100	28.00				

*Specially made for Train Control Engine Equipment measurements.

Digitized by Google

Weston Model 280 Portable Instruments

FOR DIRECT CURRENT

Accuracy, 1% of Full Scale Value

VOLTMETERS—AMMETERS—VOLT-AMMETERS

Size, 4.4x4.6x1.5 Inches

Shielded from the Effects of External Fields

These instruments are small in size and fit readily in a coat pocket. They are made in a variety of ranges for all commercial testing purposes.

Zero correction devices are provided and knife edge pointers provide for accurate reading on the scale which is 2.6 inches long, hand drawn, evenly divided.

The most popular type is the Model 280 Triple Range Volt-ammeter which in reality has six ranges as there are 3 voltage ranges and 3 current ranges.

Single range millivoltmeters and milliammeters are also quite popular.

Instruments are entirely self-contained up to 150 volts and 30 amperes.

Prices and data on instruments not listed below furnished on request.

PRICE LIST AND AVAILABLE SCALE COMBINATIONS

Triple Range Voltammeters

Ranges		Scale	Price	Ranges		Scale	Price
Volts	Amperes	Divisions	Each	Volts	Amperes	Divisions	Each
30- 3-1.5	30-3 -1.5	30	$34.50	150-15-3	15-1.5-0.15	30	$34.50
30-15-3	30-3 -0.15	30	34.50	150-15-3	15-3 -1.5	30	34.50
150-15-1	15-1.5-0.15	75	34.50	150-15-3	30-3 -1.5	30	34.50
150-15-1.5	30-3 -1.5	30	34.50	150-15-3	30-15 -3	30	34.50
150-15-1.5	30-15 -1.5	30	34.50	150-30-3	30-15 -1.5	30	34.50

Triple Range Voltmeters

Ranges, Volts	Scale Divisions	Price Each	Ranges, Volts	Scale Divisions	Price Each
25-10-2.5	50	$21.75	100-50-5	50	$21.75
30- 3-1.5	30	21.75	150-15-1.5	75	21.75
30-15-3	30	21.75	150-15-3	30	21.75
50- 5-2.5	50	21.75	150-30-3	30	21.75
50-25-5	50	21.75	150-75-3	30	21.75

Triple Range Ammeters

Ranges, Amperes	Scale Divisions	Price Each	Ranges, Amperes	Scale Divisions	Price Each
5-2.5-0.25	50	$21.75	25-2.5-0.5	50	$21.75
10-1 -0.1	50	21.75	25-5 -2.5	50	21.75
10-5 -0.5	50	21.75	25-10 -5	50	21.75
10-2.5-1	50	21.75	30-3 1.5	30	21.75
15-3 -0.15	30	21.75	30-6 -3	60	21.75
15-3 -1.5	30	21.75	30-15 -3	30	21.75

Single Range Voltmeters

	Price Each
Any scale value from 1.2V. min. to 150V. max.	$18.75

Single Range Ammeters

Any scale value from 1 amp. min. to 30 amp. max.	18.75
Scale values of 50 amps. or 100 amps. with external shunts	23.75
Leather carrying case for Model 280 Portable instruments. Net	2.00

Prices on Millivoltmeters and Milliammeters furnished on request.

Higher range voltmeters and ammeters can be arranged by the use of external multipliers and shunts. Information on request.

Digitized by Google

Type ISD Volt-Ammeter

DIRECT CURRENT

Dimensions, 6½x6¼x4 Inches; Weight, 8 Pounds

The Type ISD volt-ammeter was designed with the particular requirements of signal engineers and supervisors in mind, and in addition, it has found favor for laboratory testing where high accuracy is required. The various ranges which are incorporated provide means for the great variety of tests which have to be made.

The movement is an improved d'Arsonval type, insuring uniform scale divisions and dead beat indications. Ruggedness has not been sacrificed and experience has shown that these instruments will continue to give good service even under the severe conditions which are frequently encountered.

The solid aluminum case is black enamel finished with triple-hinged cover, snap catch and stout leather handle. The case is so designed that it is dust and waterproof. Binding posts are very heavy, as may be seen, have non-removable tops and are plainly marked with numerals indicating scale value.

A zero adjuster of convenient and efficient design is incorporated. Scales are hand calibrated and dials are not affected by moisture or by changes in temperature.

Accuracy is within ½ of 1% of full scale value at any point on the scale. Scales are 5¼ inches long.

It will be noted that in the cover are shown diagrams of connections for the various ranges. This is a great convenience as it enables proper connections to be quickly made.

The instrument is entirely self-contained, there being no external multipliers or shunts.

PRICE LIST AND AVAILABLE SCALE COMBINATIONS

No.	Ranges	Value Per Scale Division	List Price
1000	0– 3. Volts 0– 30. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.02 Volt .2 " .001 Amp. .01 " .1 "	$100.00
1001	0– 3. Volts 0– 30. " 0–150. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.02 Volt .2 " 1. " .001 Amp. .01 " .1 "	115.00
1002	0– 3. Volts 0– 30. " 0–300. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.02 Volts .2 " 2. Volts .001 Amp. .01 " .1 "	130.00
*1008	0– 3. Volts 0– 30. " 0– .03 Amp. 0– .3 " 0– 3. Amps. 0– 30. "	.02 Volt .2 " .0002 Amp. .002 " .02 " .2 "	$115.00
*1010	0– 3. Volts 0– 15. " 0–150. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.02 Volt .1 " 1. " .001 Amp. .01 " .1 "	115.00
1014	0– 1.5 Volts 0– 15. " 0–150. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.01 Volt .1 " 1. " .001 Amp. .01 " .1 "	115.00

*No. 1008 is A. R. A. Sig. Sec. Combination No. 1. No. 1010 is A. R. A. Sig. Sec. Combination No. 2.

Digitized by Google

Type ISA Volt-Ammeter

ALTERNATING CURRENT

The rapid advances recently made in electric signaling and train control devices show an increasing tendency toward the use of alternating current, and, as in the case of the direct current apparatus, suitable instruments are requisite. The problem of their design was, however, of much greater magnitude, and was solved only after long and expensive design and experimental work. This alternating current volt-ammeter finds favor with those who heretofore have been forced to use a varied assortment of ammeters and voltmeters ranging in number from two to five or more.

Dimensions, 7x6⅞x4¼ Inches; Weight, 7 Pounds

The case is of black walnut and handsome in appearance. It is provided with substantial leather handle, hinged cover and snap catch. Binding posts are heavy and have non-removable tops. Each binding post is legibly marked with a numeral corresponding to the scale value which is obtained when said binding post is employed. A zero adjuster convenient for manipulation is incorporated. Particular attention is called to the method of indicating by diagrams on the dial the proper connections for the seven different ranges, and data covering the values per scale division. These instruments operate only on alternating current and are calibrated for the frequency on which they are to be used.

Scales are 5.15″ long. Dials are not affected by moisture or by changes in temperature. Accuracy is within 1% of full scale value at any point on the scale where the frequency is within 3% of that for which the instrument is calibrated.

PRICE LIST AND AVAILABLE SCALE COMBINATIONS

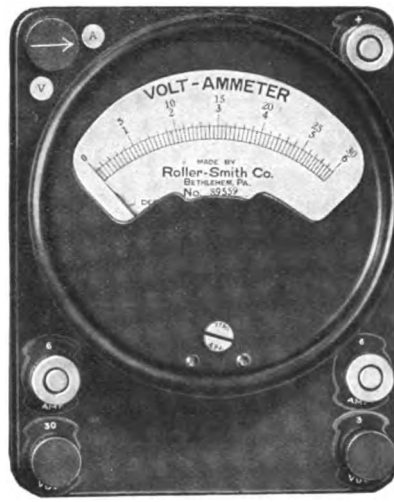
No.	Ranges	Value Per Scale Division	List Price
1005	0– 6. Volts	.05 Volt	$160.00
	0– 30. "	.25 "	
	0–120. "	1. "	
	0–240. "	2. Volts	
	0– 3. Amps.	.025 Amp.	
	0– 12. "	.1 "	
	0– 60. "	.5 "	

No.	Ranges	Value Per Scale Division	List Price
1028	0– 6. Volts	.04 Volt	$170.00
	0– 15. "	.1 "	
	0–150. "	1. "	
	0–300. "	2. Volts	
	0– 3. Amps.	.02 Amp.	
	0– 15. "	.1 "	
	0– 30. "	.2 "	

Digitized by Google

Type HSD Volt-Ammeter

DIRECT CURRENT



Dimensions, 5x4x2 Inches; Weight, 20 Ounces

For maintenance work and general testing where low cost, lightness and compactness are paramount, the Type HSD volt-ammeter is recommended.

The movement is of the d'Arsonval type of a smaller form than the one used in the larger Type ISD instrument. The scales have hair line divisions, are hand calibrated and hand drawn and are equipped with knife edge pointers, all of which combine to insure very accurate readings. Scales are 2.6" long. Dials are not affected by moisture or by changes in temperature. Accuracy is within 1½% of full scale value at any point on the scales. The case and base are of metal with a baked-on black enamel finish and are of waterproof construction. On the bottom of the base is secured a bakelite plate for insulation purposes.

Binding posts have non-removable tops, hard rubber being employed for the voltmeter ranges and polished nickel for the ammeter ranges. A switch of special design is incorporated in the instrument which allows momentary readings to be taken or it may be locked for continuous readings. A zero adjuster is provided which can be manipulated from the front of the instrument as shown in the illustration.

The general design of the instrument has been worked out with the idea of obtaining maximum ruggedness. The heavy metal case is so proportioned as to provide the greatest protection for the mechanism. The heavy raised bezel surrounding the front gives additional strength to the top and will sustain the weight of an average man without damage to the instrument.

PRICE LIST AND AVAILABLE SCALE COMBINATIONS

No.	Ranges	Value Per Scale Division	List Price
1018	0– 3. Volts 0– 30. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.05 Volt .5 " .0025 Amp. .025 " .25 "	$47.50
1020	0– 3. Volts 0– 30. " 0–150. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.05 Volt .5 " 2.5 Volts .0025 Amp. .025 " .25 "	51.75
*1022	0– 3. Volts 0– 30. " 0–300. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.05 Volt .5 " 5.0 Volts .0025 Amp. .025 " .25 "	51.75
†1024	0– 3. Volts 0– 30. " 0– .03 Amp. 0– .3 " 0– 3. Amps. 0– 30. "	.05 Volt .5 " .0005 Amp. .005 " .05 " .5 "	$51.75
‡1026	0– 3. Volts 0– 15. " 0–150. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.05 Volt .25 " 2.5 Volts .0025 Amp. .025 " .25 "	51.75
1007	0– 1.5 Volts 0– 15. " 0–150. " 0– .150 Amp. 0– 1.5 Amps. 0– 15. "	.025 Volt .25 " 2.5 Volts .0025 Amp. .025 " .25 "	51.75

No. 3151. Leather carrying case for self-contained Type HSD instruments.....$4.25 Net
No. 5552. Leather carrying case for No. 1022 volt-ammeter..... 7.60 Net

*The No. 1022 instrument has external resistance for the 300 volt range.
†A. R. A. Signal Section Combination No. 1.
‡A. R. A. Signal Section Combination No. 2.

Digitized by Google

Roller-Smith Pocket Portable

TYPE HTD

For Direct Current

Ammeters and Milli-ammeters

Voltmeters and Milli-voltmeters

Type HTD instruments are recommended particularly to electricians, signalmen, linemen, testers, "trouble shooters," garages, service stations and to all requiring small, accurate and inexpensive instruments. Though the instruments are small the scales are comparatively long and close readings can be taken. Prices are given for single range instruments only, but volt-ammeters having two voltage and two ampere scales can be furnished. Prices and descriptive literature on request.

Case size, 2¼x3¼x1⅛ inches.

Ammeters and Milli-ammeters

No.	Range	Value Per Scale Division	List Price
1145	0– 10	.25	$20.00
1147	0– 15	.5	20.00
1100	0– 50	2.0	18.75
1102	0–100	2.5	18.75
1106	0–500	20.0	18.75
1151	0– 1.5 Amps.	.05	18.75
1110	0– 3	.1	18.75
1112	0– 5	.2	18.75
1114	0– 10	.25	18.75
1116	0– 15	.5	18.75
1120	0– 30	1.0	19.50
1122	0– 50	2.0 Amps.	19.50

Voltmeters and Milli-voltmeters

No.	Range	Value Per Scale Division	List Price
1129	0–100	2.5	$18.75
1138	0–500	20.0	18.75
1142	0– 1.5 Volts	.05 Volt	18.75
1144	0– 3	.1	18.75
1148	0– 10	.25	18.75
1150	0– 15	.5	18.75
1154	0– 30	1.0	18.75
1156	0– 50	2.0 Volts	19.50
1157	0–100	2.5	20.00
1162	0–150	5.0	20.50
1166	0–300	10.0	23.00

TYPE HTA

For Alternating Current

These instruments are suitable for general testing of A. C. motor and generator circuits, light and power circuits, household appliances, etc. They are useful to electrical contractors, plant electricians, signalmen and "trouble shooters."

Ammeters and Milli-ammeters

No.	Range in Amperes	Value Per Scale Division	List Price
1500	0–100 M.A.	2.5 M.A.	$18.75
1502	0–250	10.0	18.75
1504	0–500	20.0	18.75
1507	0–1.5 Amps.	.05	18.75
1508	0–3	.1	18.75
1510	0–5	.2	18.75
1512	0–10	.25	18.75
1514	0–15	.5	18.75
1516	0–30	1.0	18.75
1518	0–50	2.0 Amps.	18.75

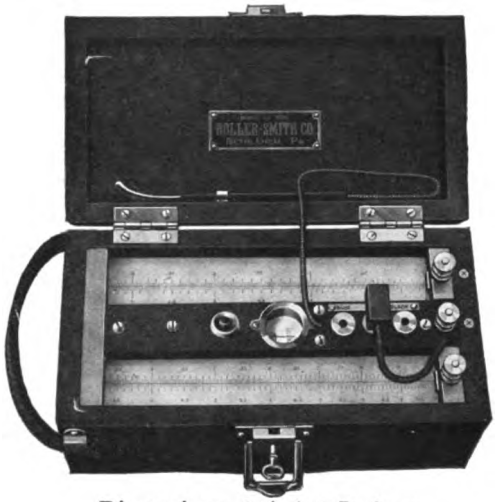
Voltmeters

No.	Range in Volts	Value Per Scale Division	List Price
1511	0–10 Volts	.25 Volt	$18.75
1513	0–15	.5	18.75
1520	0–30	1.0	18.75
1522	0–50	2.0 Volts	18.75
1526	0–100	2.5	18.75
1528	0–150	5.0	18.75

Digitized by Google

Type SOM Direct Reading Ohmmeter

SLIDE WIRE BRIDGE



Dimensions, 9½x5x5 Inches;
Weight, 5 Pounds

Determining the resistance of relay coils, slot coils, various circuits and pieces of apparatus is as readily accomplished with this ohmmeter as the reading of the resistance of relay points and other contacts.

The many available ranges of resistance allow very close readings to be made even to the thousandth part of an ohm.

This instrument is, in general, a slide wire bridge having self-contained galvanometer of sensitive but rugged design, self-contained dry cells which are conveniently located for renewal, galvanometer key, stylus and self-contained resistances—in fact, the instrument is complete in itself.

The case is of hardwood, highly polished and provided with hinged top, latch and lock and leather handle.

There are three ranges, namely, 0-1, 0-10 and 0-100 (or 0-1000) ohms, each on a scale 15 inches long, each scale is a different color—blue, red and black being used.

An unknown resistance is measured by connecting it to points XX. The plug is inserted in one of the sockets marked "blue, red, black," and the stylus tapped along the wire that runs from end to end of the scale. At a certain point there will be no deflection of the galvanometer pointer. The resistance is then read off the scale, using figures of color corresponding to the socket. If the first test indicates that a closer reading could be obtained with another range, it is only necessary to change the plug to another socket and find point of no deflection as before.

PRICE LIST AND AVAILABLE SCALE COMBINATIONS

No.	Ranges	Value Per Scale Division	List Price
1006	0–1 OHM	0–.1 ohm in .001 ohm divisions .1–.6 " " .002 " " .6–1 " " .005 " "	$90.00
	0–10 OHMS	0–1 ohm in .01 ohm divisions 1–6 ohms " .02 " " 6–10 " " .05 " "	
	0–100 OHMS	0–10 ohms in .1 ohm divisions 10–60 " " .2 " " 60–100 " " .5 " "	
1030	0–1 OHM	0–.1 ohm in .001 ohm divisions .1–.6 " " .002 " " .6–1 " " .005 " "	90.00
	0–10 OHMS	0–1 ohm in .01 ohm divisions 1–6 ohms in .02 " " 6–10 " " .05 " "	
	0–1000 OHMS	0–100 ohms in 1. ohm divisions 100–600 " " 2. " " 600–1000 " " 5. " "	

Digitized by Google

Section 10

Contents

CONSTRUCTION AND MAINTENANCE TOOLS

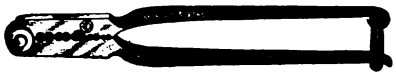
LINE SUPPLIES

NOTE—This section of the catalog is available in bulletin form. Bulletin No. 321 will be furnished upon request.

Digitized by Google

Splicing Clamps

The Splicing Clamp is one of the most important tools in the lineman's kit, and as electrically and mechanically good joints are of the utmost importance in a line, it is evident that the tools selected to do this work should have careful consideration. The following illustrations show the different styles and the sizes of wire for which they are fitted. They are hammer forged from high grade crucible tool steel; spring tempered. Heads are polished, with black handles.

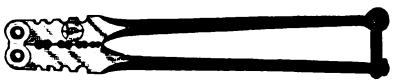


No. 17105

No. 17105. For sleeves No. 6, 8, 10, 12, 14 and 17 B. & S., No. 8, 10, 12, 14, 16 and 19 B. W. G. and intermediate sizes. Length, 10¼ inches.

COMBINATION WIRE AND SLEEVE CLAMPS

No. 12132. For wires No. 6, 8, 10 and 12 B. & S., No. 8, 10, 12 and 14 B. W. G., copper sleeves No. 4, 6, 8, 10, 12, 14 and 17 B. & S., iron sleeves No. 10, 12, 14, 16 and 19 B. W. G., and intermediate sizes. Length, 9 inches.

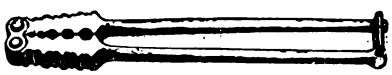


No. 12132

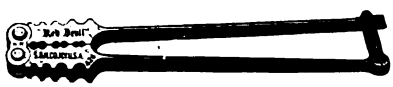
No. 15132

No. 15132. For wires No. 4, 6, 8, 10 and 12 B. & S., No. 6, 8, 10, 12 and 14 B. W. G., copper sleeves No. 6, 8, 10, 12, 14, and 17 B. & S., iron sleeves No. 6, 8, 10, 12, 14, 16 and 19 B. W. G., and intermediate sizes. Oval hole, .467x.624 inch. Length, 11¼ inches.

No. 2417. For wires No. 6, 8, 10, 12 and 14 iron, No. 4, 6, 8, 10 and 12 copper, No. 8, 10, 12 and 14 McIntyre sleeves, and intermediate sizes. File cut jaws. Length, 10¼ inches.



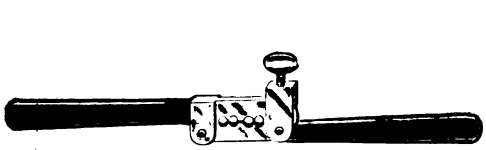
No. 2417



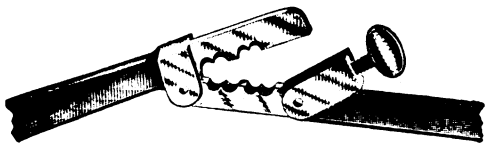
No. 2424

No. 2424. For wires No. 8, 10, 12 and 14 iron, No. 6, 8, 10 and 12 copper, No. 10, 12 and 14 McIntyre sleeves, and intermediate sizes. Length, 9 inches.

Die Stock Sleeve Twister



No. 2107—Closed



Open

Has ample leverage for use on heavy wires beyond the capacity of standard splicing clamps or connectors. Made for sleeves or bare wire. Openings are cut to order in blanks carried in stock. To insure a tool for best work, samples of sleeves or wire should accompany order.

No. 2107. Die stock sleeve twister.

Digitized by Google

Klein's Pliers

"DIAMOND SPECIAL" SIDE-CUTTING PLIER

No. 6201. Length, 6 inches.
No. 7201. Length, 7 inches.
No. 8201. Length, 8 inches.
No. 9201. Length, 9 inches.

No. 6201

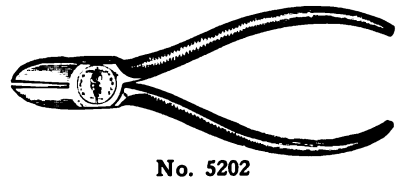
"DIAMOND SPECIAL" SIDE-CUTTING PLIER WITH SLEEVE TWISTER

No. 6212

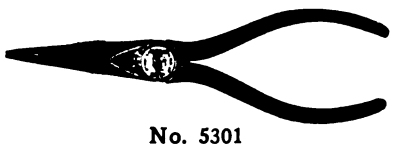
		Size of Sleeves
No. 6212.	Length, 6 inches.	No. 17 B. & S.
No. 7212.	Length, 7 inches.	No. 17 B. & S.
No. 8212.	Length, 8 inches.	No. 10 B. & S.

OBLIQUE CUTTING PLIERS

No. 5202. Length, 5 inches.
No. 6202. Length, 6 inches.



No. 5202



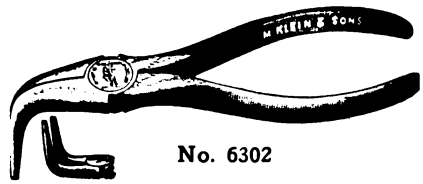
No. 5301

LONG NOSE PLIERS

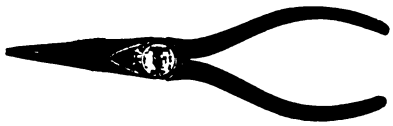
No. 5301. Length, 5 inches, without side cutter.
No. 6301. Length, 6 inches, without side cutter.
No. 5203. Length, 5 inches, with side cutter.
No. 6203. Length, 6 inches, with side cutter.

LONG CURVED-NOSE PLIER

No. 6302. Length, 6 inches, without side cutter.



No. 6302



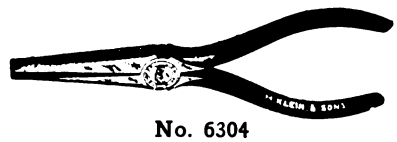
No. 6303

LONG NEEDLE-NOSE PLIER

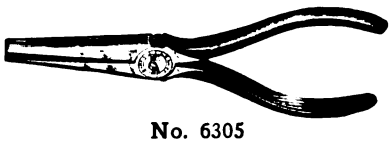
No. 6303. Length, 6 inches, without side cutter.

LONG DUCK-BILL PLIER

No. 6304. Length, 6 inches, without side cutter.
No. 6205. Length, 6 inches, with side cutter.



No. 6304



No. 6305

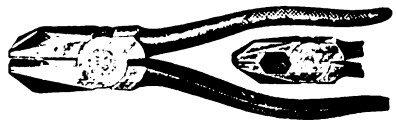
LONG FLAT-NOSE PLIER

No. 6305. Length, 6 inches, without side cutter.
No. 6206. Length, 6 inches, with side cutter.

Digitized by Google

Utica Pliers

LINEMAN'S HEAVY SIDE CUTTING PLIER

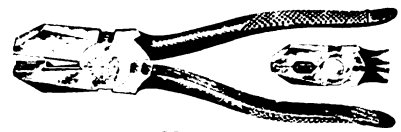


No. 1950

No. 1950. Size, 6 inches.
7 inches.
8 inches.
9 inches.

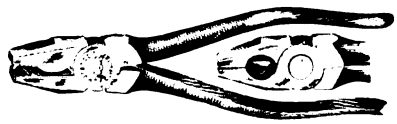
LINEMAN'S HEAVY SIDE CUTTING PLIER WITH SLEEVE TWISTER

No. 3050. Size, 6 inches.
7 inches.
8 inches.
9 inches.



No. 3050

SMOOTH HANDLE SIDE CUTTING PLIER

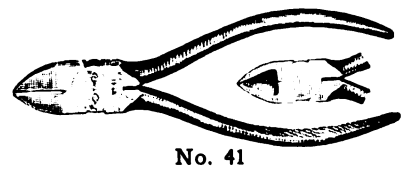


No. 1050

No. 1050. Size, 5 inches.
6 inches.
7 inches.
8 inches.

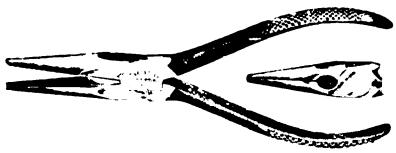
LAP JOINT DIAGONAL CUTTING PLIER

No. 41. Size, 5 inches.
6 inches.



No. 41

LAP JOINT LONG NOSE PLIER



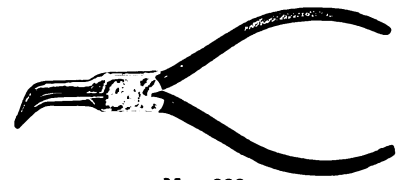
No. 654

No. 654. With side cutter, size, 5½ inches.
6 inches.
7 inches.

No. 1033. Without side cutter, size, 5½ inches.
6 inches.

LAP JOINT LONG CURVED NEEDLE NOSE PLIER

No. 888. Size, 5¾ inches.

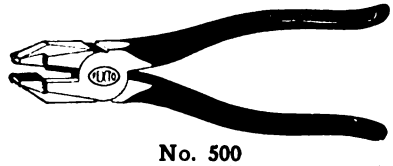


No. 888

Digitized by Google

Pexto Pliers

LINEMAN'S SIDE CUTTING PLIERS



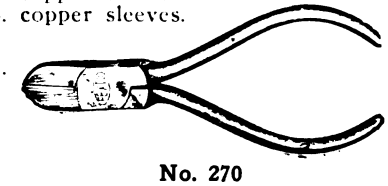
No. 500A. Length, 6 inches.
No. 500B. Length, 7 inches.
No. 500C. Length, 8 inches.
No. 500D. Length, 9 inches.

No. 500
With sleeve twister in handles

No. 501A. Length, 6 inches, for No. 14 B. & S. copper sleeves.
No. 501B. Length, 7 inches, for No. 10 B. & S. copper sleeves.
No. 501C. Length, 8 inches, for No. 8 B. & S. copper sleeves.

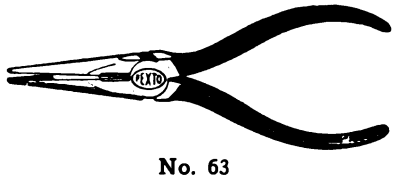
DIAGONAL CUTTING PLIERS

No. 270. Length, 5 inches.
No. 270A. Length, 6 inches.



No. 270

LONG CHAIN NOSE PLIERS

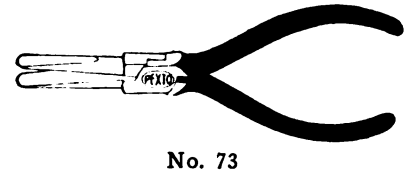


No. 63

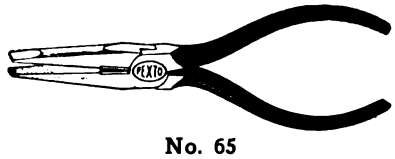
No. 43. Length, 4 inches, without side cutters.
No. 43A. Length, 4½ inches, without side cutters.
No. 43B. Length, 5 inches, without side cutters.
No. 63. Length, 5½ inches, with side cutters.
No. 63A. Length, 6½ inches, with side cutters.

DUCK BILL PLIERS

No. 73. Length, 5 inches; length of jaw, 1½ inches.
No. 73A. Length, 5½ inches; length of jaw, 1⅝ inches.
No. 73B. Length, 6 inches; length of jaw, 2 inches.



No. 73



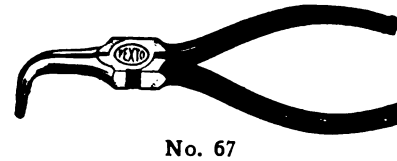
No. 65

FLAT NOSE PLIERS

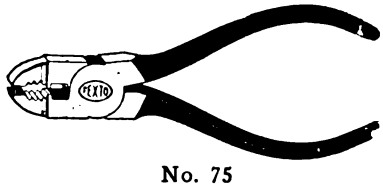
No. 52. Length, 6½ inches; length of jaw, 2⅛ inches; without side cutter.
No. 62. Length, 6½ inches; length of jaw, 2⅛ inches; with side cutter.
No. 65. Length, 5½ inches; length of jaw, 1⅞ inches; with side cutter.

CURVED NOSE PLIERS

No. 67. Length, 5½ inches; length of curve, ⅞ inch.



No. 67



No. 75

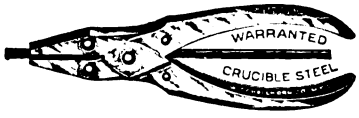
COMBINED SIDE CUTTING AND BURNER PLIERS

An ideal handy plier

No. 75. Length, 5 inches.

Digitized by Google

Bernard Pliers



No. 100. Flat Nose Pliers
Parallel Jaws. Open Throat

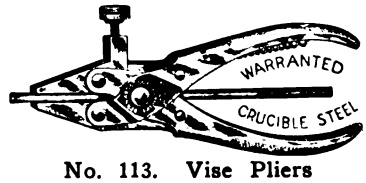
The multiplied leverage, coupled with parallel opening jaws that grip like a vise is of great advantage for mechanical work of all kinds.

Sizes, 4½, 5, 5½, 6, 6½, 7, 8 inches.

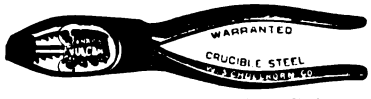
Parallel jaws, open throat, full nickel plated, non-friction automatic spring.

Made with a thumb screw locking attachment so that the plier may be used as a clamp or hand vise. This feature increases the efficiency of the tool and was originally designed for use in model and pattern making and sheet metal working.

Size, 6½ inches.



No. 113. Vise Pliers
Parallel Jaws. Open Throat

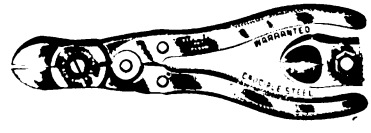


No. 502. Side Cutting Plier

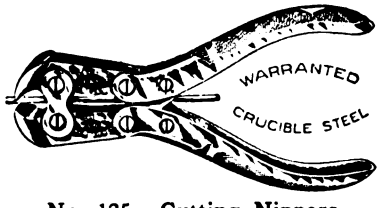
The compound leverage and quality of this tool make it the best drop forged plier for linemen and electricians and for any other heavy wire cutting use. The handles are shaped to insure the best possible leverage as well as comfort to the hand.

Size, 8 inches.

This nipper is specially designed for cutting insulated and iron wire. Does clean-cut, accurate work. The compound leverage and non-friction automatic spring make this the easiest cutting plier.



No. 177. Diagonal Cutting Pliers



No. 125. Cutting Nippers

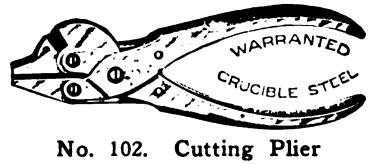
A compound leverage, open throat, powerful end cutting nipper of distinctive design and quality.

Sizes, 4, 5, 6, 7, 8 inches.

This plier, with parallel jaws and open throat, is the standard high power cutting plier with vise grip.

The 8-inch size, with smooth jaws, makes an ideal wire-eye tool for attaching wire-eyes to flexible wire in relay box wiring.

Sizes, 4½, 5, 5½, 6, 6½, 7, 8 and 8-inch smooth jaw.

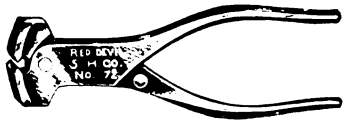


No. 102. Cutting Plier

Digitized by Google

Pliers

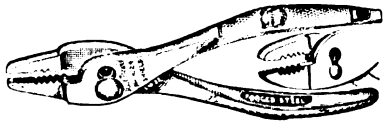
SAMPSON END CUTTING PLIERS



No. 1850

No. 1850C. Length, 5 inches.
No. 1850D. Length, 6 inches.
No. 1850E. Length, 7 inches.

ADJUSTABLE SLIP JOINT COMBINATION PLIER

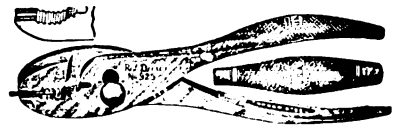


No. 2024

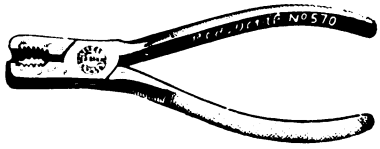
Adjustable "Slip Joint" combination pliers. New thin nose pattern. Knurled handles. Nickel plated.

No. 2024A. Length, 5¼ inches.
No. 2024. Length, 6½ inches.

No. 631. Length, 6 inches, black finish.
No. 632. Length, 6 inches, nickel plated.
No. 633A. Length, 8 inches, black finish.
No. 633. Length, 8 inches, nickel plated.
No. 643A. Length, 10 inches, black finish.
No. 643. Length, 10 inches, nickel plated.



No. 631



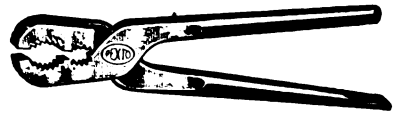
BURNER OR FIXTURE PLIERS No. 630

Knurled Handles

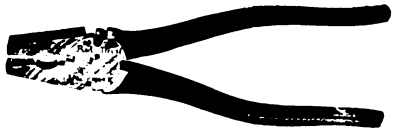
No. 630. Length, 6 inches, gun metal finish.

GAS PLIERS

No. 024P. Length, 7 inches, gun metal finish.
No. 025P. Length, 8 inches, gun metal finish.
No. 026P. Length, 9 inches, gun metal finish.
No. 027P. Length, 10 inches, gun metal finish.
No. 028P. Length, 12 inches, gun metal finish.



No. 024



No. 2000

Button Pliers, extra high grade, with four cutters and stop joint. Cuts wire and holds the wire after it is cut. Full polished head, gun metal finished handles.

No. 2000A. Length, 5 inches.
No. 2000B. Length, 6 inches.
No. 2000C. Length, 8 inches.
No. 2000D. Length, 10 inches.

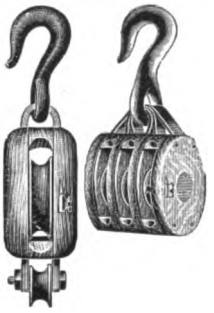
The original Fence Tool. Made of highest grade tool steel. Drives and pulls staples, cuts and straightens wire, stretches, splices and ties wire. Full polished head, gun metal finished, knurled handles.

No. 1900. Length, 11 inches.

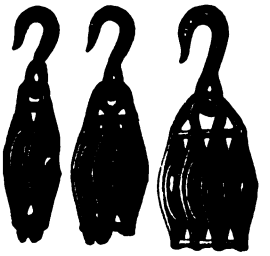
No. 1900

Digitized by Google

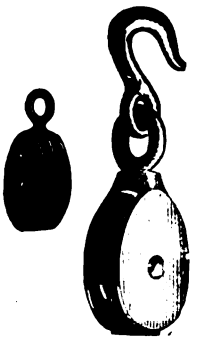
Pulley Blocks



Wood Shell



Steel Shell



Malleable Iron

WOODSHELL

Cat. No.	Size of Block	No. of Sheaves	Size of Rope	Cat. No.	Size of Block	No. of Sheaves	Size of Rope
341A.	3 -inch	Single	3/8-inch	343.	5-inch	Single	5/8-inch
341B.	3 -inch	Double	3/8-inch	344.	5-inch	Double	5/8-inch
341C.	3 -inch	Triple	3/8-inch	344A.	5-inch	Triple	5/8-inch
341.	3½-inch	Single	3/8-inch	345.	6-inch	Single	3/4-inch
342.	3½-inch	Double	3/8-inch	346.	6-inch	Double	3/4-inch
0342.	3½-inch	Triple	3/8-inch	346A.	6-inch	Triple	3/4-inch
342A.	4 -inch	Single	1/2-inch	347.	8-inch	Single	1-inch
342B.	4 -inch	Double	1/2-inch	348.	8-inch	Double	1-inch
342C.	4 -inch	Triple	1/2-inch	348A.	8-inch	Triple	1-inch

Note—State if wanted with or without becket.

MALLEABLE IRON

Cat. No.	For 3/8 inch rope
331.	2¼-inch shell, single, one eye.
331A.	2¼-inch shell, single, two eyes.
331B.	2¼-inch shell, double, one eye.
331C.	2¼-inch shell, double, two eyes.

Cat. No.	For ½ inch rope
332.	3-inch shell, single, one eye.
332A.	3-inch shell, single, two eyes.
332B.	3-inch shell, double, one eye.
332C.	3-inch shell, double, two eyes.

Cat. No.	For 3/8 inch rope
2333.	2¼-inch shell, single, with hook.
2333A.	2¼-inch shell, single, with hook and eye.
2334.	2¼-inch shell, double, with hook.
2334A.	2¼-inch shell, double, with hook and eye.

Cat. No.	For ½ inch rope
2335.	3-inch shell, single, with hook.
2335A.	3-inch shell, single, with hook and eye.
2336.	3-inch shell, double, with hook.
2336A.	3-inch shell, double, with hook and eye.

STEEL SHELL

Cat. No.	Size of Block	No. of Sheaves	Size of Rope	Cat. No.	Size of Block	No. of Sheaves	Size of Rope
100.	2-inch	Single	1/4-inch	111.	5-inch	Triple	5/8-inch
101.	2-inch	Double	1/4-inch	112.	6-inch	Single	3/4-inch
102.	2-inch	Triple	1/4-inch	113.	6-inch	Double	3/4-inch
103.	3-inch	Single	3/8-inch	114.	6-inch	Triple	3/4-inch
104.	3-inch	Double	3/8-inch	115.	7-inch	Single	7/8-inch
105.	3-inch	Triple	3/8-inch	116.	7-inch	Double	7/8-inch
106.	4-inch	Single	1/2-inch	117.	7-inch	Triple	7/8-inch
107.	4-inch	Double	1/2-inch	118.	8-inch	Single	1-inch
108.	4-inch	Triple	1/2-inch	119.	8-inch	Double	1-inch
109.	5-inch	Single	5/8-inch	120.	8-inch	Triple	1-inch
110.	5-inch	Double	5/8-inch				

Note—State if wanted with or without becket.

Digitized by Google

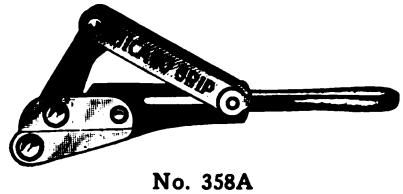
"Chicago" Grips

Main Body Piece and Lever of Forged Steel

Draw Parts of Wrought Steel

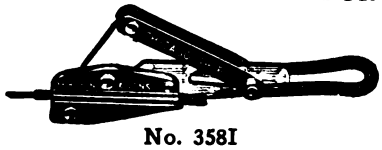
FOR BARE WIRE

	Size Wire	Max. Opening
No. 358A.	6 and smaller	3/2 inch
No. 358C.	0 and smaller	5/16 inch
No. 358E.	0000 and smaller	1/2 inch



No. 358A

FOR INSULATED WIRE



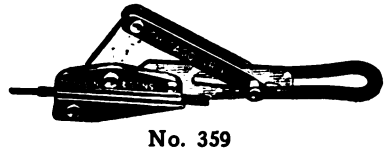
No. 358I

	Size Wire	Max. Opening
No. 358I.	4 and smaller	1/2 inch
No. 358K.	00 and smaller	9/16 inch
No. 358M.	0000 and smaller	3/4 inch

FOR ALUMINUM WIRE

Both gripping jaws are smooth and cannot injure the cable. Special grips with copper lined jaws furnished to order. Specify size of cable when ordering.

	Size of Cable	Max. Opening
No. 359.	000 A. C. S. R. to 336,400 C. M.	3/4 inch
No. 360.	397,500 C. M. to 500,000 C. M.	1 1/8 inch

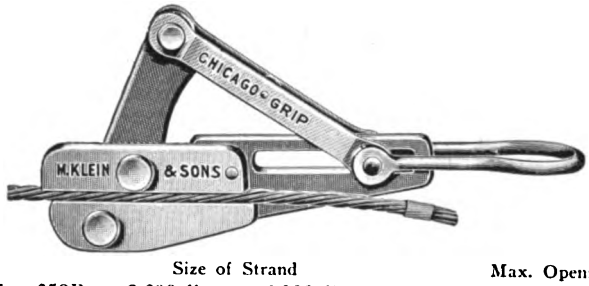


No. 359

NEW AUTOMATIC STRAND PULLER

Specially designed for pulling guys and messenger strand.

Almost automatic in action. Made of tool steel. A necessary part of a lineman's equipment.



	Size of Strand	Max. Opening
No. 358B.	2,200 lb. to 6,000 lb.	11/32 inch
No. 359D.	10,000 lb. to 16,000 lb.	1 1/8 inch

Digitized by Google

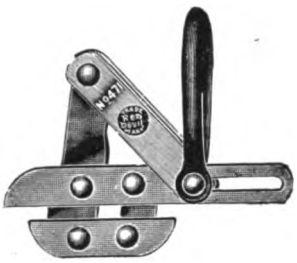
Standard Buffalo Grips

FOR BARE WIRE

No. 571. Buffalo Grip. For No. 6 wire and smaller.

No. 572. Buffalo Grip. For No. 0 wire and smaller.

No. 573. Buffalo Grip. For No. 0000 wire and smaller.



FOR INSULATED WIRE

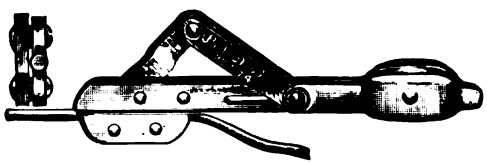
Will not slip or injure the insulation.

No. 574. Buffalo Grip. For ½ inch wire and smaller.

No. 575. Buffalo Grip. For ⅝ inch wire and smaller.

Locks open with eye in position shown

STANDARD BUFFALO GRIPS WITH PULLEYS



FOR BARE WIRE

No. 671. For No. 6 wire and smaller, for ⅜-inch rope.
No. 672. For No. 0 wire and smaller, for ½-inch rope.
No. 673. For No. 0000 wire or smaller, for ⅝-inch rope.

FOR INSULATED WIRE

No. 674. For ½-inch and smaller wires.
No. 675. For ⅝-inch and smaller wires.

SINGLE PURCHASE LINEMAN'S TOOL

FOR BARE WIRE

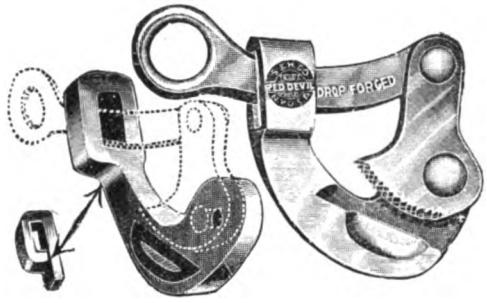
No. 2871. For No. 6 and smaller wires.
No. 2872. For No. 0 and smaller wires.

FOR INSULATED AND WEATHERPROOF WIRE

No. 2874. For ½-inch and smaller wires.
No. 2875. For ⅝-inch and smaller wires.

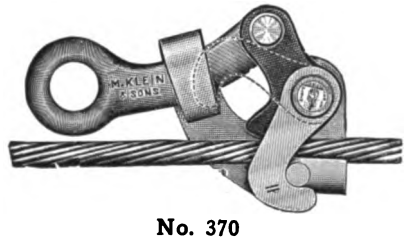
Digitized by Google

Haven's Steel Clamps



No. 3680. For No. 8 wire and finer. Galvanized finish.
No. 3090. For ½-inch wire and finer. Galvanized finish.
No. 5661. For No. 8 wire and finer. Gun metal finish.
No. 5681. For ½-inch wire and finer. Gun metal finish.

IMPROVED EXTRA HEAVY HAVEN CLAMP



No. 370

Adapted for handling plain or stranded wire from No. 6 to ¼ inch in diameter. The particular feature of construction is the addition of a swing latch which engages with stud on the lower jaw, thus centralizing the pressure on the cross-back, which is strongly made of turned machine steel.

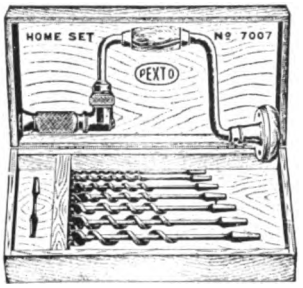
Self-Locking Troubleman's Blocks

No. 479B

No. 479B. Weight, 2½ lbs. each.
Furnished with 25 feet of ⅜ inch Manila rope.

Consists of light steel-shell blocks, galvanized, fitted with snubbing hook to lock load in any position. The blocks are arranged with spring guard snap hooks. May be used with two grips attached to the snaps, or with the hook (shown in illustration) to anchor to an insulator pin or other convenient anchorage.

Digitized by Google



Ratchet Brace and Bit Sets

Set consists of 7 auger bits, one each ¼, ⅜, ½, ⅝, ¾, ⅞ and 1 inch, one 10-inch ball bearing head and nickel plated ratchet brace, with automatic spring chuck; all contained in fancy box.

No. 570

AUGER BITS

The most practical auger bit made and guaranteed to give satisfaction.

For rapid boring in any wood with or across the grain. Will not choke. Pulls itself in without pushing.

	Size in 16ths		Size in 16ths		Size in 16ths
No. 260	4	No. 263	10	No. 266	16
No. 260A	5	No. 263A	11	No. 267	17
No. 261	6	No. 264	12	No. 268	18
No. 261A	7	No. 264A	13	No. 269	20
No. 262	8	No. 265	14	No. 270	22
No. 262A	9	No. 265A	15	No. 271	24

SOLID CENTER AUGER BIT

Type 22

Irwin Pattern

Double Cutter	Extension Lip
	Size in 16ths
No. 880	3
No. 881	4
No. 882	5
No. 883	6
No. 884	7
No. 885	8
No. 886	9
No. 887	10
No. 888	11
No. 889	12
No. 890	13
No. 891	14
No. 892	15
No. 893	16

SOLID CENTER CAR BIT

Type 56

Irwin Pattern

Double Cutter	Extension Lip
12-inch Twist, 6-inch Shank Total Length, 18 inches	
	Size in 16ths
No. 820	4
No. 821	5
No. 822	6
No. 823	7
No. 824	8
No. 825	9
No. 826	10
No. 827	11
No. 828	12
No. 829	13
No. 830	14
No. 831	15
No. 832	16
No. 833	17
No. 834	18
No. 835	19
No. 836	20

Sizes up to 32/16 inch when specified

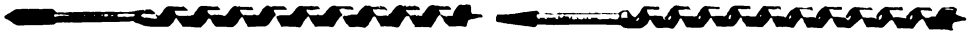
These bits are made of extra high grade special crucible auger bit steel. They are finished in first class style and each bit is fully warranted.

Owing to the fact that these bits have but one crimp it is impossible for them to choke as the clearance is double. No pressure is required in boring and they will bore either in end or side of wood. Having a solid center they are therefore much stronger and will bore much more rapidly than any other style.

Digitized by Google

Ship and Car Auger Bits with Screw

FORD PATTERN



SHIP AUGER BIT

Type 66J

	Size in 16ths
No. 840	4
No. 841	5
No. 842	6
No. 843	7
No. 844	8
No. 845	9
No. 846	10
No. 847	11
No. 848	12
No. 849	13
No. 850	14
No. 851	15
No. 852	16
No. 853	17
No. 854	18
No. 855	19
No. 856	20

Adapted for special or difficult work of any sort. Guaranteed to bore straight and to be exact in size. Recommended for hard, knotty or end grain wood. A durable, serviceable and easy working auger bit.

SHIP AUGER CAR BIT

Type 64J

	Size in 16ths
No. 860	6
No. 861	7
No. 862	8
No. 863	9
No. 864	10
No. 865	11
No. 866	12
No. 867	13
No. 868	14
No. 869	15
No. 870	16
No. 871	17
No. 872	18
No. 873	19
No. 874	20
No. 875	21
No. 876	22
No. 877	23
No. 878	24

The most popular type of bit for car builders' use. Works easily and bores true in any kind of wood. Adapted for cross grain, angular or end boring. Of superior stock, exact size and high finish.

Sizes up to 32/16 furnished when specified

Expansive Bits

No. 267. Small size, with two cutters, one from ½ to ⅞, one from ⅞ to 1½ inch.
No. 268. Large size, with two cutters, one from ⅞ to 1¾, one from 1¾ to 3 inch.
No. 267-3. Extra set of cutters for No. 267 Expansive Bit.
No. 268-4. Extra set of cutters for No. 268 Expansive Bit.

Derrick Augers

Have twist of the solid center type 18 inches long, with a head having a single cutting edge as on ship augers. Square end is about 12 inches long with the end threaded and fitted with nut. Over all length, 36 inches, including 6 inches of round shank.

	Size, inches		Size, inches
No. 920	½	No. 925	1⅛
No. 921	⅝	No. 926	1¼
No. 922	¾	No. 927	1½
No. 923	⅞	No. 928	1¾
No. 924	1	No. 929	2

Digitized by Google

Chain Drill

AUTOMATIC FEED. BALL BEARING
USE WITH A BIT BRACE

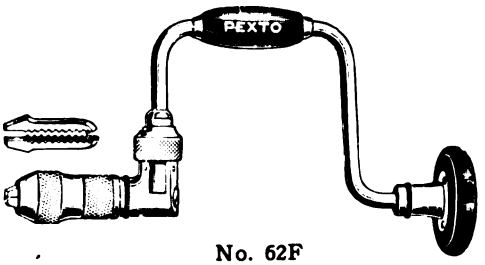
Takes $\frac{3}{16}$ in. to ½ in. round or square shank drills. Equipped with 3-foot steel chain. Universal chuck.

No. 2018. Chain Drill.

RATCHET BIT BRACE

Self Adjusting Alligator Jaws

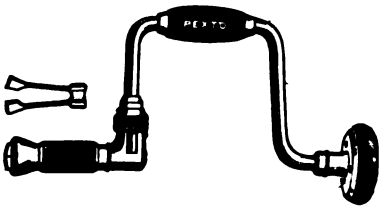
No. 62F. 6-inch sweep.
No. 82F. 8-inch sweep.
No. 102F. 10-inch sweep.
No. 122F. 12-inch sweep.
No. 142F. 14-inch sweep.



No. 62F

RATCHET BIT BRACE

Nickel Plated Automatic Chuck



No. 66F

Cocobolo head and center, full steel clad and screw fastened.

Ball Bearing Head

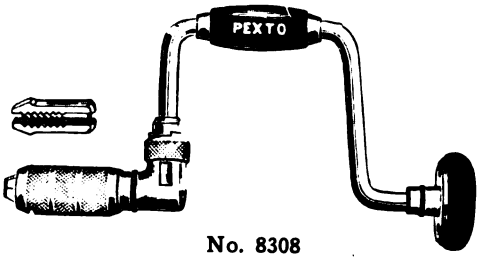
No. 66F. 6-inch sweep.
No. 86F. 8-inch sweep.
No. 106F. 10-inch sweep.
No. 126F. 12-inch sweep.
No. 146F. 14-inch sweep.

CONCEALED RATCHET BIT BRACE

Alligator Jaws—½-inch Capacity Round or Square Shank

Cocobolo head and center, full steel clad and screw fastened.

No. 8308. 8-inch sweep.
No. 8310. 10-inch sweep.
No. 8312. 12-inch sweep.
No. 8314. 14-inch sweep.

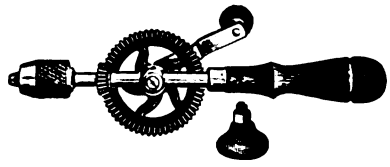


No. 8308

Digitized by Google

Hand and Breast Drills

No. 303. MILLERS FALLS HAND DRILL

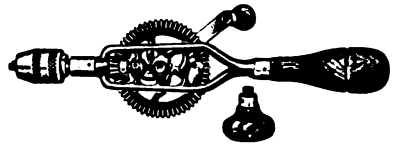


Hollow end handle, quickly detached and with receptacle large enough to hold any twist drills within capacity of tool. Three jaw chuck holds round shanks up to ⅜-inch diameter. Length, 11¼ inches. Weight, 1½ pounds.

No. 980. MILLERS FALLS HAND DRILL

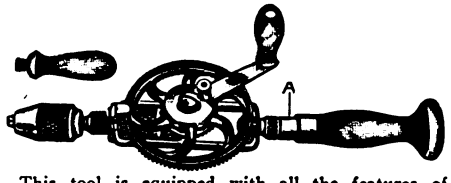
Instantly changeable speed, 1½ to 1 and 4 to 1, operated by shifting knurled ring B. Chuck is Star pattern, three jaw, capacity ⅜-inch. Hollow end handle detached by loosening knurled nut and pressing on plunger, A. Ball thrust bearing at C. Length, 15¼ inches. Weight, 3⅛ pounds.

No. 5. MILLERS FALLS HAND DRILL



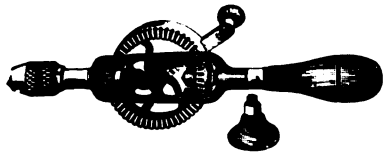
Hollow end handle, with screw cap, containing 8 wood boring points, ⅛ to 11/64-inch. Large gear has wide rim to be grasped between thumb and fingers when delicate work is being done. Provided with idler gear to equalize bearings. Three jaw chuck with ⅜-inch capacity. Length, 12½ inches. Weight, 1 5/6 pounds.

No. 1980. MILLERS FALLS HAND DRILL



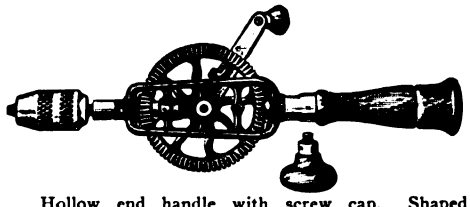
This tool is equipped with all the features of No. 980, and in addition is provided with a simple and effective ratchet, operated by raising and turning to right or left cap to a small boss on crank handle. Very convenient for crowded places and for delicate work. Capacity of chuck, ⅛-inch. Length, 15¾ inches. Weight, about 3 1/3 pounds.

No. 105. MILLERS FALLS HAND DRILL



A new tool with three jaw chuck of the Star pattern. Jaws open evenly by means of springs which will not get out of order. Holds round shanks to ¼ inch. Hollow end handle with screw cap. Contains 8 wood boring points. Length, 12½ inches. Weight, 1 2/3 pounds.

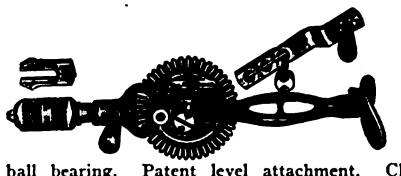
No. 2. MILLERS FALLS HAND DRILL



Hollow end handle with screw cap. Shaped to be used as a breast drill if desired. Contains 8 wood boring points.

Removable side grip handle. Three jaw chuck with ⅜-inch capacity. Length, 14½ inches. Weight, 2½ pounds.

No. 12 MILLERS FALLS BREAST DRILL



Completely equipped with ball bearing. Patent level attachment. Changeable speed from even to 3 to 1. Breast plate adjustable for different positions and removable. Extension crank with radius from 4 to 6 inches, adding to the power of the tool. Length, 17½ inches. Weight, 6½ pounds.

With master chuck, holding round shanks from ⅛ to ½ inch, all sizes of bit stock and No. 1 taper shanks.

Digitized by Google

"Yankee" Screw Drivers Automatic Drills

No. 30

No. 30. "YANKEE" SPIRAL RATCHET SCREW DRIVER

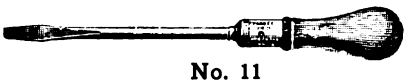
Drives or draws screws by pushing on handle or by ratchet movement on handle. Three bits are included with each tool. Extreme length with bit in chuck, extended 19¼ inches, closed 13½ inches.

No. 15. "YANKEE" RATCHET SCREW DRIVER

Right or Left Hand and Rigid

A light blade screw driver for small screws in electric work, etc. It has on its blade a knurled washer, as shown in cut, and by means of this, blade can be turned with a finger and the thumb. Length, blade, 2, 3, 4, 5 inches.

No. 15



No. 11

No. 11. "YANKEE" RATCHET SCREW DRIVER

Right or Left Hand Ratchet and Rigid

Adjustment for right or left hand ratchet is made by slide in direction across length of blade. Length, blade, 3, 4, 5, 6, 8, 10 inches.

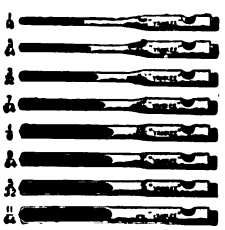
No. 44. "YANKEE" AUTOMATIC DRILL

This tool has an adjustable tension for spring so its strength can be regulated to suit large or small drills, soft or hard woods, and greatly reduces risk of breaking of drill points. Has 8 drill points in plain sight when magazine is open. When drill is being inserted in chuck, open end of magazine is up, so it can be left open without drills falling out. Length, 11¼ inches. Provided with 8 drill points, 1/16 to 11/64-inch. Weight, ¼ pound.

No. 44

ATTACHMENTS FOR "YANKEE" SPIRAL RATCHET SCREW DRIVERS

Chuck



HALF ACTUAL SIZE

Drill Points

The following attachments cost little and add very much to the all-around usefulness of the tools.

In ordering attachments, be particular to state for what style and size spiral ratchet screw driver they are wanted.

Chuck and Drill Points

The use of a chuck converts a Yankee spiral ratchet screw driver into a boring tool. The outside of the chuck corresponds to the bit of a driver in size, the inside to the shank of drill points used in Yankee automatic drills. The drill point is first put into chuck, and the two put into chuck of spiral ratchet screw driver.

A set consists of a chuck and 8 drill points, 1/16 to 11/64, inclusive, packed in a round wooden box.

Those for Nos. 30 and 130 have shanks 9/32-inch diameter and also fit No. 20, size 2.

Those for Nos. 31 and 131 have shanks 5/16-inch diameter and also fit No. 20, size 3.

Digitized by Google

Screw Drivers

PERFECT HANDLE SCREW DRIVER

A solid, one-piece, drop forging. The oval shaped wood handle gives great leverage, fits the hand, and is more comfortable than other shapes. Blade extends from end to end so that it can never become loose.

Length Blade Inches	Diameter Inches	Length Blade Inches	Diameter Inches
3	1/4	7	5/16
4	1/4	8	3/8
5	1/4	10	3/8
6	5/16	12	3/8

CHAMPION SCREW DRIVER

Forged from toughest steel, well finished throughout.

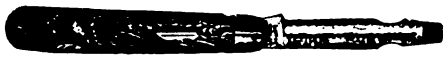
Length of blade, 2½, 3, 4, 5, 6, 8, 10, 12 inches.

ELECTRICIAN'S SCREW DRIVERS

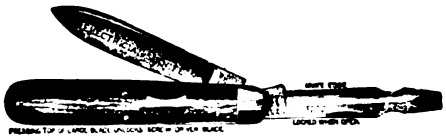
Drop Forged Blades, Ebonized Rock Maple Handles

No. 640. 2½-inch blade.
No. 641A. 3½-inch blade.
No. 641. 4½-inch blade.
No. 642A. 5½-inch blade.
No. 642. 6½-inch blade.
No. 643A. 7½-inch blade.
No. 643. 8½-inch blade.
No. 644. 10½-inch blade.
No. 645. 12½-inch blade.

Electrician's Knife



No. 401



No. 402

No. 401. Single blade.
No. 402. Double blade.

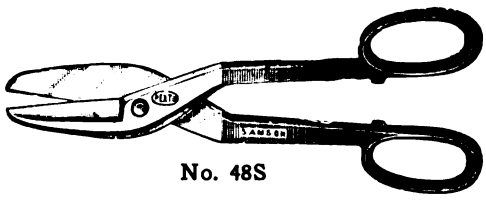
A combination of knife and screw driver. The screw driver blade has an edge on one side for scraping wires, so that the knife blade need not be used for that purpose, but kept sharp for other uses. Screw driver blade when opened is locked and cannot close on hand.

Digitized by Google

New Easy Bolt Cutter

	Size	Capacity
No. 8155A.	18 inches	$\frac{5}{16}$-inch
No. 8155B.	24 inches	$\frac{3}{8}$-inch
No. 8155C.	30 inches	$\frac{1}{2}$-inch
No. 8155D	36 inches	$\frac{5}{8}$-inch

No. 8155



No. 48S

TINNER'S SNIPS

No. 48S. 3½-inch cut, entire length 13 inches.

No. 49S. 3-inch cut, entire length 12 inches.

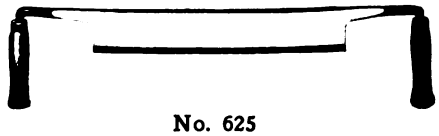
Have black handles and polished blades.

LINEMAN'S DRAW SHAVE

Heavy blade, 1¾ inches wide.

No. 625. Size, 12-inch.

No. 625A. Size, 14-inch.



No. 625

No. 542

SOCKET FRAMING CHISEL

Plain or Bevel Edge—Ringed Handle

No. 542. 1 inch.

No. 543. 1½ inches.

No. 544. 2 inches.

Smaller sizes also furnished.

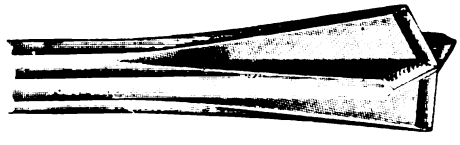
STEEL COLD CHISEL

No. 531A.	¼x5¼ inches.
No. 531B.	⅜x5½ inches.
No. 531C.	½x6 inches.
No. 531D.	⅝x6½ inches.
No. 531E.	¾x7 inches.
No. 531F.	⅞x7½ inches.
No. 531G.	1x8 inches.

No. 531

STAR DRILLS

No.	Length	Diameter (see note)
161A.	8 in.	¼ to 1 in. as specified.
161B.	12 in.	¼ to 1½ in. as specified.
161C.	18 in.	½ to 2 in. as specified.
161D.	24 in.	½ to 2½ in. as specified.



No. 161

Note—Diameters vary by sixteenths from ¼ inch to ½ inch, by eighths from ½ inch to 2 inches, and quarters from 2 inches to 2½ inches.

Digitized by Google

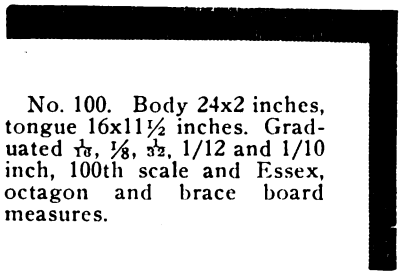
No. 3 MICROMETER

For measurement by thousandths up to 1 inch. Has lock nut and ratchet stop.

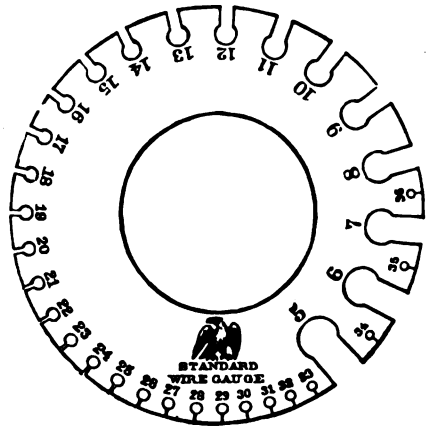
AMERICAN STANDARD WIRE GAUGE

These gauges are tempered, adjusted and warranted accurate.

No. 619. Measuring from 0 to 36.
No. 620. Measuring from 5 to 36.



No. 100. Body 24x2 inches, tongue 16x11½ inches. Graduated $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{32}$, 1/12 and 1/10 inch, 100th scale and Essex, octagon and brace board measures.



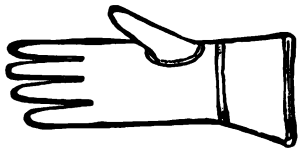
No. 100 STEEL SQUARE

Cut solid from the metal plates without welding, and then tempered and trued up to obtain absolute angle accuracy. All edges hardened, insuring accuracy and prolonging the life of the square. Markings are deep cut and accurate.

PURE GUM SEAMLESS RUBBER GLOVES

WITH LONG WRISTLETS

For 4,000 Volts or 10,000 Volts as Specified



No. 58D

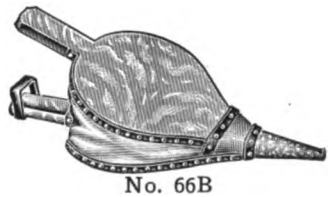
No. 58C. To fit size 9 hand.
No. 58F. To fit size 9½ hand.
No. 58G. To fit size 10 hand.

HEAVY ACID RUBBER GLOVES

No. 58D. With 5-inch gauntlet, furnished in sizes as above.
No. 58E. With 9-inch gauntlet, furnished in sizes as above.

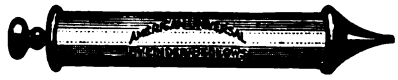
HAND BELLOWS

No. 66B. 6 inches.
No. 77B. 7 inches.
No. 88B. 8 inches.
No. 99B. 9 inches.
No. 110B. 10 inches.



No. 66B

CYLINDER BELLOWS

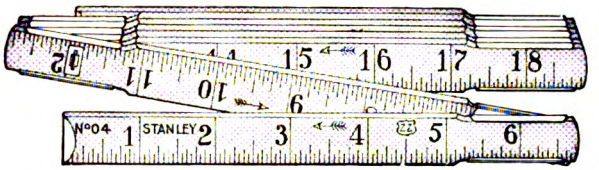


Designed especially for cleaning motors, generators, locking, switchboards and electrical apparatus. Made of composition fibre with wood mounting. **Will not short circuit electrical apparatus.** Made in four sizes:

No. 101. Length, 20 inches.
No. 102. Length, 22⅜ inches.
No. 103. Length, 24¾ inches
No. 104. Length, 25⅛ inches.

Digitized by Google

ZIG-ZAG RULERS



No. 02

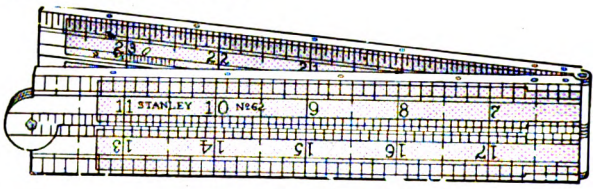
No. 02R. Length, 2 feet.
No. 03R. Length, 3 feet.
No. 04R. Length, 4 feet.
No. 05R. Length, 5 feet.
No. 06R. Length, 6 feet.

Above rules are six-inch fold, yellow enamel.

Rivet joint is shipped unless otherwise specified.

BOXWOOD RULE

No. 63. Two feet four-fold square-joint edge plates, 8ths, 10ths, 12ths, and 16ths of inches, drafting scales 1 inch wide.

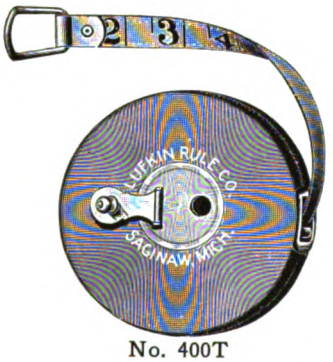


No. 63

TAPE LINES

Linen

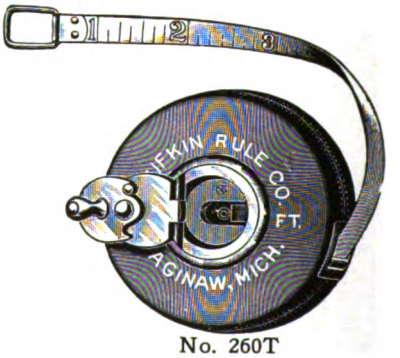
No. 400T. 25 feet.
No. 403T. 50 feet.
No. 405T. 75 feet.
No. 406T. 100 feet.



No. 400T

Steel

No. 260T. 25 feet.
No. 263T. 50 feet.
No. 265T. 75 feet.
No. 266T. 100 feet.



No. 260T

IRON LEVEL

WOOD LEVEL

No. 130S. Iron, 3½ inches long.
No. 35A. 6½ inches long, rosewood, without plumb.
No. 35B. 8 inches long, rosewood, with plumb.
No. 35C. 10 inches long, rosewood, with plumb.
No. 35D. 12 inches long, rosewood, with plumb.

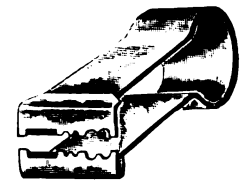
Digitized by Google

P. & G. Wire Skinner

The P. & G. Wire Skinner is designed to fill the long felt want for a quick-acting wire skinner. This device splits the outer insulation on a duplex wire by one pull leaving the braid adhering to the inner wires.

Another stroke of the tool, using the middle teeth, splits the insulation on the single wire, lengthwise without damaging the wire, leaving it ready for scraping.

The act of removing the insulation from the wire by using the scraper, leaves it perfectly clean and ready for soldering, and does away with the use of a knife in any of the operations.

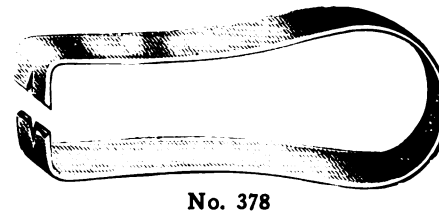


One-Third Actual Size
No. 2300-10

PERRY WIRE PEELER

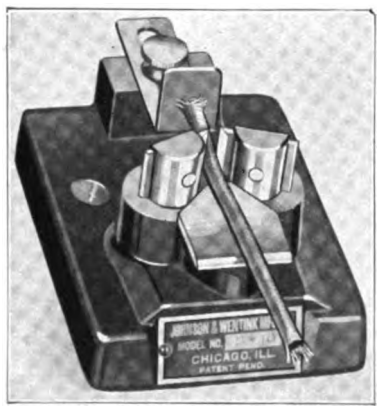
No. 378. Polished steel.

This handy little tool is adapted to the use of all wire-men who have many wire ends to peel. A man can cut the wire readily up to No. 12 size with a very slight effort, and the peeler should become an invaluable aid where there is enough work to justify its use.



No. 378

Simplex Wire Stripper



The Model S-10 Wire Stripper

Where a great many wires of the same gauge are to be stripped, the Model S-10 Simplex Wire Stripper will be found to increase the production and reduce the cost.

In wiring up standard relay boxes at a central location or where jumpers of various lengths are made up in large quantities for use in wiring relay boxes, signal mechanisms, etc., this stripper will be found to expedite the work materially.

In repair shops, in wiring up interlocking machines and in other uses where the same size of wire must be stripped frequently, this tool will be found useful.

The device must be securely fastened to work bench or any other suitable support by means of two wood screws furnished.

To operate this device the blades must first be adjusted to size of wire and the adjustable stop must be set for the length of wire to be stripped.

Insert wire between the blades until reaching stop, then with a quick forward pull the insulation is removed, leaving all strands.

In stripping parallel or Duplex Braid one must be sure that the two wires are vertical between the blades.

Digitized by Google

Counters

No. 618. POLE COUNTER OR REGISTER

No. 618

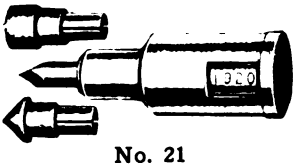
In using the Register place the middle finger of the left hand through the ring holding the Register in position so as to bring the pusher directly under the thumb. In order to insure registration the pusher must be pushed down as far as it will go, then allowed to spring back to its place. In commencing to count, only the 0's should appear, thus 0 0 0. The Register will count to 999; the next registration or count causes the 0 0 0's to appear, making 1,000. After taking off any particular count or registration (for example 125), and it is desired to set the Register to 0, press the pusher down the required number of times until the 0 appears at the right and then change the other figures at the left by turning the thumb buttons on back of Register till the 0's appear, always turning the thumb button of middle dial first. This Register can be set at any figure desired before starting a count.

No. AB2. HAND TALLY COUNTER WITH QUICK SET-BACK

No. AB2

This new instrument with four figures, embodies a number of desirable features not found in any other hand tally, chief among which is the fact that it can be quickly set to zero by one turn of the knob. The case is small in size and has been designed with rounded corners so as not to irritate the hand of the user, nor to wear the pockets when carrying it. Also the finger ring has been so located that it can be held in either hand when being used.

No. 21. SPEED COUNTER



No. 21

To use this counter, first note the reading of the Register, then place the point lightly against the end of the revolving shaft; the spindle of the instrument will turn freely. When the second hand of the watch has come to 0, press on the end of the instrument and it will instantly begin to count. At the end of the minute, remove the pressure and the count stops instantly because the register is automatically disengaged by a spring clutch. The difference between the reading of the counter at the beginning and end of the minute indicates the revolutions-per-minute of the shaft.

It is never necessary to "set" the counter, but should this seem desirable, hold the point against the revolving shaft and the register will quickly come to 0. When the shaft to be indicated turns one way, the counter adds; when it turns the other way the counter subtracts. It works equally well either way. The final reading remains in sight and cannot be accidentally disturbed.

A ball thrust bearing is provided for the spindle. This insures that the operation of the counter will be extremely easy and free from any tendency to heat or stick at high speeds. The counter will register 9,999 and can be used on either high speed or low speed machinery. Two rubber tips, one pointed, the other flat, are furnished with each instrument. These serve as insulators when taking the speed of electric machinery. The flat tip can also be used on flat or pointed shafts. The counter is not affected by magnetism.

In using this counter, the operator need look only at the watch. This may be any watch having a second hand. A stop-watch is not needed because of the clutch in the counter. The straight-reading index is easy to read and avoids errors.

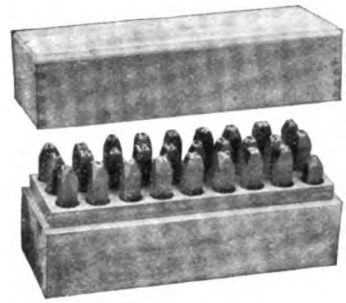
Because the counter is started and stopped at the right time, a perfectly accurate count is obtained. This is not possible with any other speed counter.

NEVER OIL

Digitized by Google

Steel Letters and Figures

Hand Made or Machine Made as Specified
For Stamping All Kinds of Metal, Fibre, Leather, Wood, etc.

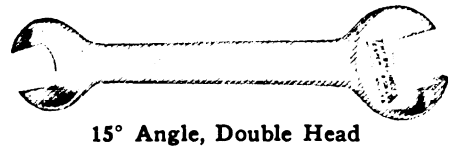


	Size	Letters No.	Figures No.	Letters No.	Figures No.
		MACHINE MADE		HAND MADE	
ABCDEFGHI	3/32-inch	101	1101	201	1201
ABCDEFG	1/24-inch	102	1102	202	1202
ABCDEF	1/20-inch	103	1103	203	1203
ABCDEF	1/16-inch	104	1104	204	1204
ABCDE	1/12-inch	105	1105	205	1205
ABCDE	3/32-inch	106	1106	206	1206
ABCD	1/10-inch	107	1107	207	1207
ABCD	1/8-inch	108	1108	208	1208
ABC	5/32-inch	109	1109	209	1209
ABC	3/16-inch	110	1110	210	1210
AB	7/32-inch	111	1111	211	1211
AB	1/4-inch	112	1112	212	1212
AB	5/16-inch	113	1113	213	1213
A	3/8-inch	114	1114	214	1214
A	7/16-inch	115	1115	215	1215
A	1/2-inch	116	1116	216	1216

Digitized by Google

Billings Drop Forged Wrenches

ENGINEER'S WRENCHES



15° Angle, Double Head

This wrench was designed originally for Engineers, but its use has been broadened until today it is unquestionably the most universally used and most popular type of open end wrench manufactured. Each of these wrenches has been scientifically proportioned for the work that it is designed for.

They are drop forged from specially selected open hearth steel. The steel is analyzed in a modern metallurgical laboratory before being used. In addition these tools are heat treated after machining to toughen and harden the steel. They are smoothly polished and finished in attractive "Duro" black rust-proof finish with heads brightened and lacquered, or nickel plated with heads buffed.

The heads of the wrenches are plainly marked showing the purpose for which they are intended.

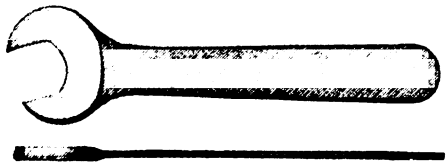
B & S. No.	Trade No.	U. S.S. Bolt Size	Hexagon Head Cap Screw Size	S. A. E. Standard Screw and Nut	Milled Opening	Lth.
1100A	...	.. – 1/8	.. – 1/8	.. – ..	1/4 – 5/16	3 1/2
1100	721	1/8 – ..	1/8 – 1/8	.. – ..	5/16 – 3/8	4
1101	21	1/8 – 1/8	1/8 – ..	.. – ..	1/16 – 3/8	4
1102	722	1/8 – ..	1/8 – 1/4	.. – 1/4	1/16 – 5/16	4 1/2
1103	22	1/8 – 1/4	1/8 – 5/16	.. – 5/16	5/16 – 1/2	4 1/2
1104	723	.. – ..	5/16 – 1/4	.. – 1/4	3/8 – 5/16	4 1/2
1105	723A	.. – 1/4	5/16 – 5/16	.. – 5/16	3/8 – 1/2	4 1/2
1107	23	5/16 – 1/4	.. – 5/16	.. – 5/16	7/16 – 1/2	4 1/2
1106	724	.. – ..	5/16 – 3/8	.. – 3/8	3/8 – 5/16	5
1108	24	5/16 – 5/16	.. – ..	.. – ..	7/16 – 7/16	5
1109	725	.. – 1/4	1/4 – 5/16	1/4 – 5/16	5/16 – 1/2	5
1110	725A	.. – ..	1/4 – 3/8	1/4 – 3/8	1/2 – 5/16	5
1111	725B	1/4 – ..	5/16 – 3/8	5/16 – 3/8	1/2 – 5/16	5 1/2
1112	25	1/4 – 5/16	5/16 – ..	5/16 – ..	1/2 – 7/16	5 1/2
1113	726	1/4 – ..	5/16 – 5/16	5/16 – 5/16	1/2 – 5/8	6
1114	26	1/4 – 3/8	5/16 – ..	5/16 – ..	1/2 – 11/16	6
1116	727	.. – ..	3/8 – 5/16	3/8 – 5/16	5/16 – 5/8	6
1118X	27C	.. – 3/8	3/8 – ..	3/8 – ..	5/16 – 11/16	6 1/2
1118	27	5/16 – 3/8	.. – ..	.. – ..	7/16 – 11/16	6 1/2
1117	728	.. – ..	3/8 – 1/2	3/8 – 1/2	5/16 – 3/4	7
1119	28	5/16 – 5/16	.. – ..	.. – ..	7/16 – 5/8	7
1119X	...	.. – 3/8	5/16 – ..	5/16 – ..	5/8 – 11/16	7
1120	729	.. – ..	5/16 – 1/2	5/16 – 1/2	5/8 – 3/4	7
1120X	28S	.. – 5/16	5/16 – ..	5/16 – ..	5/8 – 7/8	7
1123X	...	3/8 – ..	.. – 1/2	.. – 1/2	11/16 – 3/4	7
1123	29	3/8 – 5/16	.. – ..	.. – ..	11/16 – 7/8	7
1121	730	.. – ..	5/16 – 5/16	5/16 – ..	5/8 – 11/16	8
1122	730A	.. – 1/2	5/16 – 5/8	5/16 – 5/16	5/8 – 7/8	8
1124	30	3/8 – 1/2	.. – 5/8	.. – 5/16	11/16 – 7/8	8
1125	731	.. – ..	1/2 – 5/16	1/2 – ..	3/4 – 11/16	9
1126	731A	1/2 – ..	1/2 – 5/8	1/2 – 5/16	3/4 – 7/8	9
1128	31	5/16 – 1/2	.. – 5/8	.. – 5/16	13/16 – 7/8	9
1130	731B	.. – 1/2	5/16 – 5/8	.. – 5/16	11/16 – 7/8	9
1129	32	5/16 – 5/16	.. – ..	.. – ..	13/16 – 15/16	10
1131	732	.. – ..	5/16 – 3/4	.. – 1/2	11/16 – 1	10
1131X	33A	1/2 – ..	5/8 – ..	5/8 – 5/8	7/8 – 1/16	10
1132	33	1/2 – 5/16	5/8 – ..	.. – 5/16	7/8 – 15/16	10
1132X	33C	.. – ..	.. – 3/4	5/8 – 1/2	1/16 – 1	10
1133	733	.. – 1/2	5/8 – 3/4	5/8 – 1/2	7/8 – 1	10
1134	34	1/2 – 5/8	5/8 – ..	5/8 – 3/4	7/8 – 1 1/16	11
1135	734	1/2 – ..	5/8 – 7/8	5/8 – ..	7/8 – 1 1/8	11
1136X	34A	.. – 5/8	.. – ..	5/8 – 3/4	1/16 – 1 1/16	11
1136	35	5/16 – 5/8	.. – ..	.. – 3/4	15/16 – 1 1/16	11
1138	735	.. – ..	3/4 – 7/8	1/2 – ..	1 – 1 1/8	11
1137	36	5/16 – 3/4	..–1	.. – 7/8	15/16 – 1 1/4	12
1139	736	.. – 3/4	3/4–1	1/2 – 7/8	1 – 1 1/4	12
1140	37	5/8 – 3/4	..–1	3/4 – 7/8	1 1/16 – 1 1/4	12
1140X	737	.. – 3/4	7/8–1	.. – 7/8	1 1/8 – 1 1/4	12
1141	38	5/8 – 7/8	.. – ..	3/4–1	1 1/16 – 1 1/8	14
1145	739	3/4 – ..	1 –1 1/8	7/8 – ..	1 1/4 – 1 3/8	14
1146	39	3/4 – 7/8	1 – ..	7/8–1	1 1/4 – 1 7/8	14
1148	40	3/4–1	1 – ..	7/8–1 1/8	1 1/4 – 1 5/8	16
1150	41	7/8–1	.. – ..	1 –1 1/8	1 7/8 – 1 5/8	16
1151	42	7/8–1 1/8	.. – ..	1 –1 1/4	1 7/8 – 1 11/16	18
1153	43	1 –1 1/8	.. – ..	1 1/8–1 1/4	1 5/8 – 1 11/16	18
1154	44	1 –1 1/4	.. – ..	1 1/8–1 3/8	1 5/8–2	21
1155	45	1 1/8–1 1/4	.. – ..	1 1/4–1 3/8	1 11/16–2	21
1156	46	1 1/8–1 3/8	.. – ..	1 1/4–1 1/2	1 11/16–2 7/16	23
1157	47	1 1/4–1 3/8	.. – ..	1 3/8–1 1/2	2 –2 7/16	23
1158	48	1 1/4–1 1/2	.. – ..	1 3/8 – ..	2 –2 3/8	24
1159	49	1 3/8–1 1/2	.. – ..	1 1/2 – ..	2 3/16–2 3/8	24
1160	50	1 3/8–1 5/8	.. – ..	1 1/2 – ..	2 1/16–2 1/16	26

Digitized by Google

Billings Drop Forged Wrenches

The wrenches are drop forged from specially selected open hearth steel. The steel is analyzed in a modern metallurgical laboratory before being used. In addition these tools are heat treated after machining to toughen and harden the steel. They are smoothly polished and finished in attractive "Duro" black rust-proof finish, with heads brightened and lacquered.

The heads of the wrenches are plainly marked showing the purpose for which they are intended.



THIN HEAD CHECK-NUT WRENCHES

15° Angle, Single Head

This line of dependable Thin Head Check-Nut Wrenches is an exact counterpart of the single head Engineers' wrench line except that it is made thinner and lighter. These wrenches are designed for use on check nuts, lock nuts and adjusting screws where a thin head wrench must be used.

No.	Trade No.	U. S. Standard Bolt Size	Hexagon Head Cap Screw Diameter Screw	S. A. E. Standard Nut and Cap Screws Size Bolt	Milled Opening	Length
1300X	...	..	..	..	7/16	4
1300	601	1/4	5/16	5/16	1/2	4
1301	602	5/16	..	..	19/32	4½
1302	603	3/8	..	..	11/16	5½
1303	604	7/16	..	..	25/32	6¼
1304	605	1/2	5/8	9/16	7/8	7
1305	606	9/16	..	..	31/32	8
1306	607	5/8	..	3/4	1 1/16	9
1307	608	3/4	1	7/8	1¼	10
1308	609	7/8	..	1	1 7/16	11½
1309	610	1	1 3/8	1 1/8	1 5/8	13

Furnished in Black Finish only.

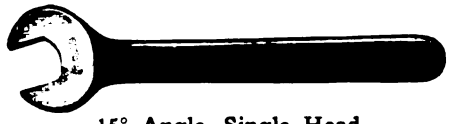
Digitized by Google

Billings Drop Forged Wrenches

ENGINEERS' WRENCHES

These wrenches are drop forged from specially selected open hearth steel. The steel is analyzed in a modern metallurgical laboratory before being used. In addition these tools are heat treated after machining to toughen and harden the steel. They are smoothly polished and finished in attractive "Duro" black rust-proof finish, with heads brightened and lacquered.

The heads of the wrenches are plainly marked showing the purpose for which they are intended.

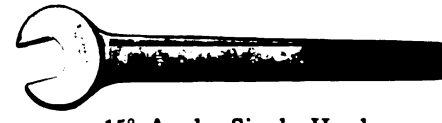


15° Angle, Single Head Flared Handle

This line of dependable wrenches is designed for shop use, and has a flared handle which fits the hand of the user. Each of these wrenches has been scientifically proportioned for the work that it is intended for.

No.	Trade No.	U. S. S. Bolt Size	Hex. Head Cap Screw Size	Milled Opening	Length	Thickness of Head
1000A	..	..	..	1/4	3	15/64
1000	00	1/8	1/8	5/16	3	13/64
1000B	..	..	3/16	3/8	3 1/2	15/64
1001	0	3/16	..	13/32	4	1/4
1002	701	..	1/4	7/16	4	1/4
1003	1	1/4	5/16	1/2	5	5/16
1004	702	..	3/8	9/16	5	5/16
1005	2	5/16	..	19/32	5 1/2	11/32
1006	703	..	7/16	5/8	5 1/2	11/32
1007	3	3/8	..	11/16	6 1/2	3/8
1008	704	..	1/2	3/4	6 1/2	3/8
1009	4	7/16	..	25/32	7 1/2	13/32
1010	705	..	9/16	13/16	7 1/2	13/32
1011	5	1/2	5/8	7/8	8	13/32
1012	6	9/16	..	31/32	8 1/2	15/32
1013	706	..	3/4	1	8 1/2	15/32
1014	7	5/8	..	1 1/16	9 1/4	15/32
1015	707	..	7/8	1 1/8	11	17/32
1016	8	3/4	1	1 1/4	11	17/32
1017	708A	..	1 1/8	1 3/8	13	21/32
1018	9	7/8	..	1 7/16	13	21/32

Furnished in Black Finish only.



15° Angle, Single Head Tapered Handle

This line of wrenches is designed for heavy duty, and has a tapered handle permitting the use of both hands.

No.	Trade No.	U. S. S. Bolt Size	Hex. Head Cap Screw Size	Milled Opening	Length	Thickness of Head
1019	709	..	1 1/4	1 1/2	15	3/4
1020	10	1	..	1 5/8	15	3/4
1021	11	1 1/8	..	1 13/16	16 1/2	15/16
1022	12	1 1/4	..	2	18	15/16
1023	13	1 3/8	..	2 3/16	20	1 1/16
1024	14	1 1/2	..	2 3/8	22	1 1/16
1025	15	1 5/8	..	2 7/16	24	1 1/16
1026	16	1 3/4	..	2 3/4	26	1 1/4
1027	16A	1 7/8	..	2 15/16	28	1 3/8
1028	17	2	..	3 1/8	30	1 3/8
1029	18	2 1/4	..	3 1/2	34	1 7/16
1030	19	2 1/2	..	3 7/8	38	1 9/16
1031	19A	2 3/4	..	4 1/4	42	1 5/8
1032	20	3	..	4 5/8	43	1 5/8
1033	20A	3 1/4	..	5	43	1 7/8
1034	21A	3 1/2	..	5 3/8	45	2 1/2
1035	21B	3 3/4	..	5 3/4	47	2 1/2
1036	21C	4	..	6 1/8	49	2 1/2
1037	22A	4 1/2	..	6 7/8	51	3
1038	22B	5	..	7 5/8	53	3

Digitized by Google

Billings Drop Forged Wrenches

CAR WRENCHES

These wrenches are drop forged from specially selected open hearth steel. The steel is analyzed in a modern metallurgical laboratory before being used.

The unfinished wrenches are milled but not hardened. The hardened wrenches are hardened in oil and are furnished in this natural finish.

22½° Angle, Double Head

These dependable wrenches were designed especially for car work. They are built extra heavy for this severe work. They are made with milled openings from $\frac{33}{32}$" to $2\frac{7}{16}$".

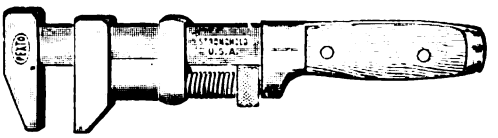
No.	Trade No.	U. S. Standard Bolt Size	Milled Opening	Length	Thickness of Heads
1800	367	⅜– ½	$\frac{33}{32}$– $\frac{33}{32}$	12	$\frac{7}{16}$
1801	370	½– ⅝	$1\frac{5}{16}$–$1\frac{1}{8}$	19	½
1802	371	½– ¾	$1\frac{5}{16}$–$1\frac{5}{16}$	20	½
1803	373	⅝– ¾	$1\frac{1}{8}$–$1\frac{5}{16}$	20	$\frac{9}{16}$
1804	374	⅝– ⅞	$1\frac{1}{8}$–$1\frac{1}{2}$	21	$\frac{9}{16}$
1805	376	¾– ⅞	$1\frac{5}{16}$–$1\frac{1}{2}$	21	$\frac{9}{16}$
1806	377	¾–1	$1\frac{5}{16}$–$1\frac{11}{16}$	22	⅝
1807	379	⅞–1	$1\frac{1}{2}$–$1\frac{11}{16}$	22	⅝
1808	380	⅞–$1\frac{1}{8}$	$1\frac{1}{2}$–$1\frac{7}{8}$	23	⅝
1809	382	1 –$1\frac{1}{8}$	$1\frac{11}{16}$–$1\frac{7}{8}$	23	⅝
1810	383	1 –$1\frac{1}{4}$	$1\frac{11}{16}$–$2\frac{1}{16}$	24	⅝
1811	385	$1\frac{1}{8}$–$1\frac{1}{4}$	$1\frac{7}{8}$–$2\frac{1}{16}$	24	⅝
1812	387	$1\frac{1}{8}$–$1\frac{1}{2}$	$1\frac{7}{8}$–$2\frac{7}{16}$	25	¾
1813	389	$1\frac{1}{4}$–$1\frac{1}{2}$	$2\frac{1}{16}$–$2\frac{7}{16}$	25	¾

Hardened wrenches will be furnished unless otherwise specified.

Digitized by Google

Wrenches

SOLID KNIFE HANDLE WRENCH



No. 595

No. 595.	6-inch.	Opens ⅞ inch.
No. 596.	8-inch.	Opens 1¼ inches
No. 597.	10-inch.	Opens 1¾ inches.
No. 598.	12-inch.	Opens 2⅛ inches.
No. 599.	15-inch.	Opens 2¾ inches.
No. 600.	18-inch.	Opens 3⅛ inches.
No. 601.	21-inch.	Opens 4¼ inches.

By Actual Test the Strongest Wrench Made

The entire bar of this wrench is a solid steel forging of one piece, thereby having the greatest tensile strength. They are undoubtedly the superior of any screw wrench on the market.

All steel railroad wrenches in same sizes furnished when specified.

ADJUSTABLE WRENCH

(Crescent Pattern)

No. 190

No. 190.	Length, 4 inches; capacity, ½ inch.
No. 190A.	Length, 6 inches; capacity, ¾ inch.
No. 190B.	Length, 8 inches; capacity, 1⅛ inch.
No. 190C.	Length, 10 inches; capacity, 1⅛ inches.
No. 190D.	Length, 12 inches; capacity, 1⅝ inches.

DOUBLE END ADJUSTABLE ANGLE WRENCH

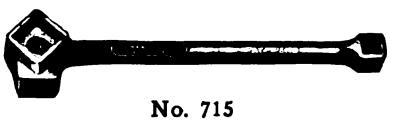
No. 191

No. 191.	Size, 4- 6; capacity, ½ and ¾ inch.
No. 191A.	Size, 6- 8; capacity, ¾ and 1⅛ inch.
No. 191B.	Size, 8-10; capacity, 1⅛ and 1⅛ inches.
No. 191C.	Size, 10-12; capacity, 1⅛ and 1⅝ inches.

COMBINATION LAG SCREW AND NUT WRENCHES

No. 326

No. 326. Drop forged, galvanized. For hexagon and square nuts ⅛ inch to ⅝ inch and lag screws from ¼ inch to ¾ inch. Length, 13½ inches.



No. 715

No. 715. The Chance Special Lineman's Wrench takes the place of a hammer for driving lags, pins, bolts, pole steps, etc., and fits all the Standard Nuts and Lags used in pole line construction.

Will tighten nuts on two or three bolt messenger clamps. Nuts may be tightened without removing the wrench from the nuts.

The wrench is 13 inches long, weighs 2½ pounds and has handle 1 inch wide, oval in shape. It hangs nicely in the lineman's belt, with small end down.

Digitized by Google

The Walworth Parmelee Wrench

Will make up nipples without damage to threads. No lost motion. Works in closest places. Takes new hold with slightest movement. Makes or breaks tightest joints. No teeth—it cannot chew. Does not mar brass pipe. Perfect ratchet action.

Nos. 1, 2 and 3. Nut Lock

Highest Efficiency on Any Kind of Pipe Work

	Length	Size Pipe
No. 1	10″	⅜″ to 1″
No. 2	20″	1″ to 2″
No. 3	20″	2″ to 3″
No. 4	37″	3″ and 4″

Extra Girths

	Sizes
No. 1	⅜″, ½″, ¾″, 1″
No. 2	1″, 1¼″
No. 2	1½″, 2″
No. 3	2″, 2½″, 3″
No. 4	3″
No. 4	4″

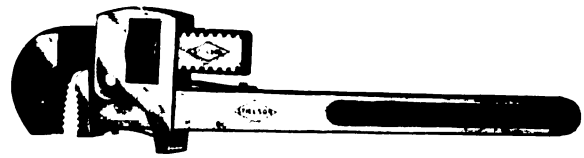
Extra Pins

	Size Wrench
No. 1	No. 2
No. 2	No. 2
No. 3	No. 3
No. 4	No. 4

Wrenches furnished with girths (as listed) unless otherwise specified.

STEEL HANDLE PIPE WRENCH

	Lgth., Ins. Sizes	Takes Pipe up to
No. 590	6-inch	½″
No. 590A	8-inch	¾″
No. 591	10-inch	1″
No. 591A	14-inch	1½″
No. 592	18-inch	2″
No. 592A	24-inch	2½″
No. 593	36-inch	3½″
No. 593A	48-inch	1″ to 5″



No. 590 to 593A

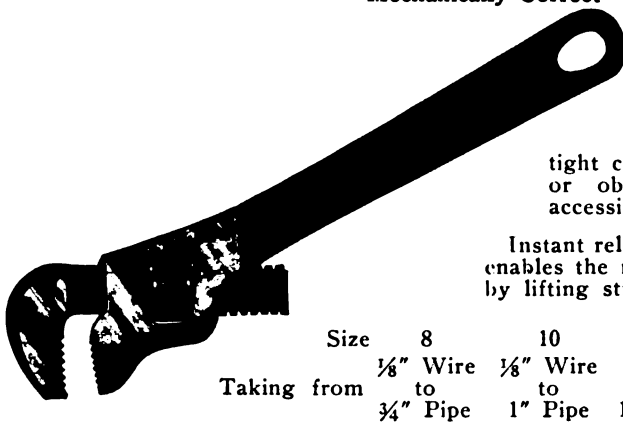
All parts interchangeable.

Made from high-grade steel and material throughout.

Wood handle wrenches in sizes up to 14 inches, furnished when specified.

LAWSON PIPE WRENCH

Mechanically Correct



The angle handle gives one-eighth turn of a pipe lying parallel with a floor, wall or ceiling, where the ordinary straight handle wrench gives none. In tight corners and among other pipes or obstructions, the Lawson has accessibility equal to that of a tong.

Instant release, a distinct Lawson feature, enables the removing of wrench from pipe by lifting straight off.

Size	8	10	14	18	24
Taking from	⅛″ Wire to ¾″ Pipe	⅛″ Wire to 1″ Pipe	¼″ Wire to 1½″ Pipe	¼″ Wire to 2″ Pipe	¼″ Wire to 2½″ Pipe

Digitized by Google

Pipe Tools

BURRING REAMERS

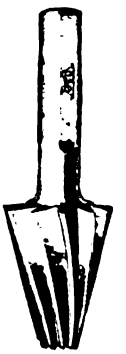
For removing burr in ends of pipe to admit tangs or in the ends of conduit to prevent cutting of insulation when pulling wires.

Bit Brace Shank

No. 33. Burring reamer for ⅛ inch to 1¼ inch pipe.
Point diameter, ⅛ inch.
Largest diameter, 1½ inches.
Bit brace shank.

No. 330. Same as No. 33, except with ½ inch round shank.

No. 5. Burring reamer for 1¼-inch to 2-inch pipe.
Point diameter, 1⅜ inches.
Largest diameter, 2⅛ inches.
Bit brace shank.



Round Shank

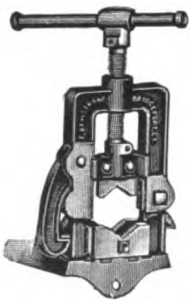
RATCHET BURRING REAMER

A high class three-blade reamer. The blades which are firmly imbedded in body to prevent misalignment, are made of the highest grade alloy steel obtainable. Will ream from ¼-inch to 3-inch pipe, which makes this tool take the place of any two reamers on the market.

No. 045. Ratchet burring reamer.

No. 045

ARMSTRONG MALLEABLE HINGE PIPE VISE



Vise No.	Capacity Pipe, Inches	Weight Pounds
00	⅛ to 1¼	3
0	⅛ to 2½	11
1	⅛ to 2½	16
2	½ to 4½	30
3	1 to 6	35

No. 51. CHAIN PIPE VISE

Capacity, ⅛ to 2½ inches

A handy, compact little vise, possessing maximum strength, while of minimum weight. Easily carried in tool kit. Equipped with standard jaws. Having features not found in similar vises, the double lever tightening device being above the bench, rather than below, insuring faster and smoother operation.

No. 51. Chain pipe vise, 2½-inch capacity.

Digitized by Google

Pipe Tools

NYE TOLEDO TYPE STOCKS THREADING 1 TO 2 INCHES

Also adapted for use with Solid Dies ⅛- to ¾-inch

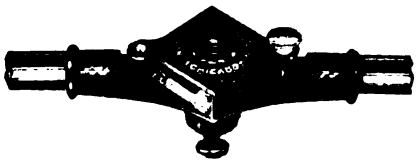
No. 1

No. 1A

The rugged construction and few working parts account for the simplicity and durability of these Nye Toledo Type models. They do the work easily and efficiently. The No. 1A is the same as the No. 1 except that it is equipped with a ratchet for work where space is restricted.

NYE SOLID MALLEABLE STOCKS

Complete with Nye Improved Skip-Tooth Dies



These stocks are complete with Nye dies and guides. Right hand dies are furnished unless otherwise specified.

Stock No.	Dimensions of Dies	Stock Contains Dies for Pipe Sizes	Dies Furn. as Extras
1	2½x2½x¾	¼, ⅜, ½, ¾, 1	⅛
1½	3 x3 x¾	½, ¾, 1, 1¼, 1½	⅛, ¼, ⅜
2	4 x4 x⅞	1, 1¼, 1½, 2	½, ¾

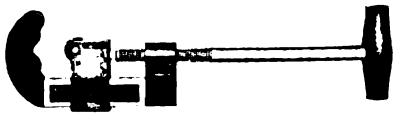
NYE SOLID DIES

The Nye patented feature of removing every alternate tooth in the back of the die to reduce friction is used in Nye Solid Dies. These dies are hardened and tempered in oil and made of finest tool steel.

Stock No.	Dimension of Dies	SIZES
0	2 x2 x ½	⅛, ¼, ⅜, ½
1	2½x2½x ¾	⅛, ¼, ⅜, ½, ¾, 1
1½	3 x3 x ¾	⅛, ¼, ⅜, ½, ¾, 1, 1¼, 1½
2	4 x4 x ⅞	½, ¾, 1, 1¼, 1½, 2
4	5 x5 x1¼	2½, 3

NYE THREE-WHEEL PIPE CUTTER—BARNES TYPE

Equipped with Three Nye Knurled Cutter Wheels

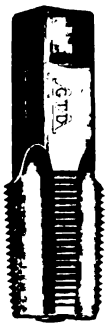


Nye three-wheel Barnes type cutters are especially designed for cutting pipe in corners and where cutters cannot be revolved entirely around the pipe. The frame is made of certified malleable castings. The pins are hardened. Parts are interchangeable with other cutters of the same pattern.

Cutter No.	Cuts Pipe
1	⅛ to 1″
2	½ to 2″
3	1½ to 3″
4	2½ to 4″
5	4 to 6″
6	6 to 8″

Digitized by Google

Pipe Tools



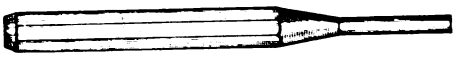
PIPE TAPS

American standard right hand pipe thread unless otherwise specified. Sizes not listed furnished to specification.

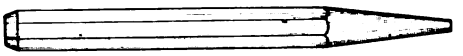
Pipe Size Inches	Am. Std. Thds. Per Inch	Pipe Size Inches	Am. Std. Thds. Per Inch
½	14	1¼	11½
¾	14	1½	11½
⅞	14	2	11½
1	11½	2½	8

PUNCHES AND PIN PULLERS

In working with pipes and cranks about mechanical interlockings, the punches and pin pullers shown below will be found extremely useful.



No. 1818. Drift Punch



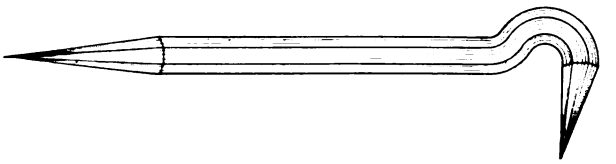
No. 1819. Starting Punch

Rivet Punches

For removing ¼-inch rivets from signal pipe, these punches are found to be indispensable.

No. 1818. Drift punch for ¼-inch rivets.
No. 1819. ¼-inch rivet starting punch.

Pin Pullers



No. 1861. Cotter Pin Puller

Has one curved and one straight tapered round point for pulling cotters.

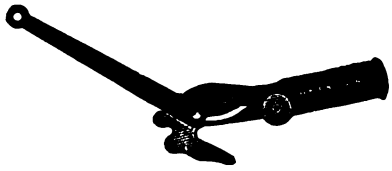
No. 1862. Combination Cotter and Crank Pin Puller

Has one curved round tapered point for pulling cotters and one angular chisel point for pulling crank pins.

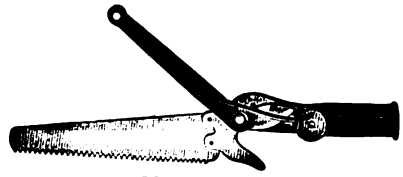
These tools are made from best grade tool steel, carefully tempered.

Digitized by Google

Favorite Tree Trimmers



No. 3600-20



No. 3600-21

This trimmer, as its name implies, is a favorite among users.

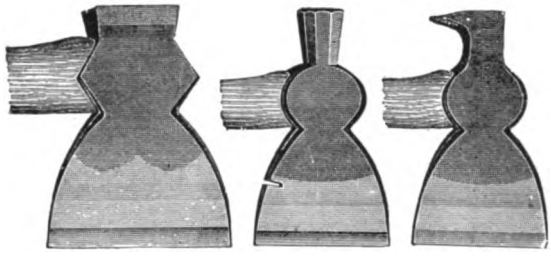
The head is constructed of malleable iron, and comprises the hook portion with which the knife operates and the socket into which the handle is inserted. This socket is perfectly straight, eliminating the necessity of tapering the end of the handle. The knife is forged from crucible steel and is integral with the lever and the cutting edge is carefully tempered and ground, making it very effective. This trimmer will sever a 1-inch branch. The knife is held open by a flat steel spring and is operated by a rope attached to the end of the lever.

Two threaded holes are provided for attaching a saw. See cut No. 3600-21.

No. 3600-20. Tree Trimmer, less saw.
No. 3600-21. Tree Trimmer, complete with saw.
No. 913-12. Saw only, for application to No. 3600-20.
No. 3603- 8. 16 ft. handle in two 8 ft. sections.
No. 3603-16. 16 ft. solid handle.
No. 3601- 9. 18 ft. handle in two 9 ft. sections.
No. 3601-18. 18 ft. solid handle.

Note—The joints in the two-piece handles are secured by ferrules and are extremely rigid and serviceable.

Hatchets



Broad Shingling Claw

LINEMAN'S BROAD AXE

	Width Cut Inches	Weight, Each
No. 2	4½	2 lbs., 10 oz.
No. 3	5	3 lbs.
No. 4	5½	3 lbs., 2 oz.
No. 5	6	4 lbs.
No. 6	6½	4 lbs., 6 oz.

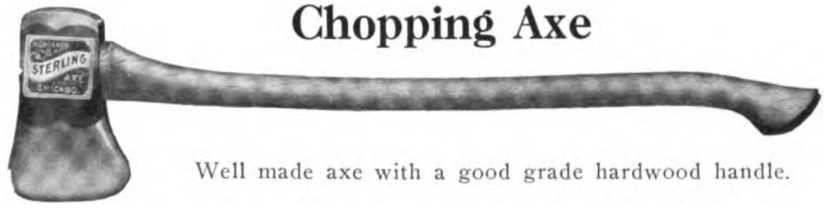
SHINGLING HATCHETS

	Width Cut Inches	Weight, Each
No. 2	3⅞	2 lbs., 4 oz.
No. 3	4⅜	2 lbs., 9 oz.

CLAW HATCHETS

	Width Cut Inches	Weight, Each
No. 2	3⅞	2 lbs., 4 oz.
No. 3	4⅜	2 lbs., 12 oz.

Chopping Axe

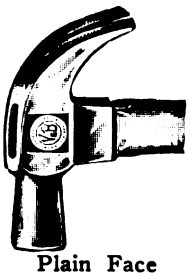


Well made axe with a good grade hardwood handle.

Number 11	Single bitted	Weight, 4 to 4½ pounds
Number 12	Single bitted	Weight, 5 to 5½ pounds

Digitized by Google

Hammers

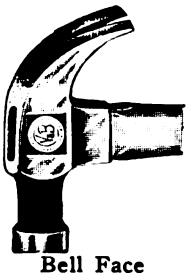


Plain Face

NAIL HAMMERS

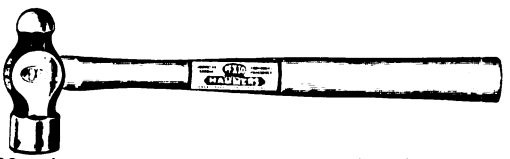
Made of extra warranted drop forged steel. Hardened face and tempered claws. High polish finish. Furnished with first quality white hickory handles.

Plain Face Numbers....	0	1	1½	2	3
Bell Face Numbers.....	10	11	11½	12	13
Weight, Ounces	24	20	16	12	7



Bell Face

BALL PEIN—MACHINISTS' HAMMERS

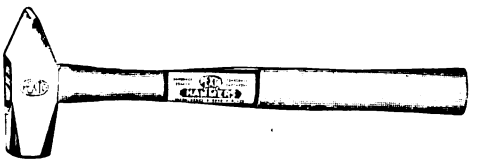


Drop forged, hardened faces and peins, hickory handles. Plain eye.

Numbers	6-0	5-0	4-0	3-0	2-0	0	1	2	3	4	5	6
Weight, each, lbs.....	3/16	¼	3/8	½	¾	1	1¼	1½	1¾	2	2¼	2½

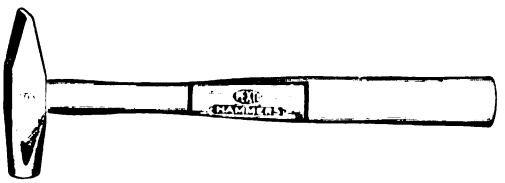
BLACKSMITHS' OR ENGINEERS' HAMMERS—CROSS PEIN

Drop forged from special steel. Hardened faces and peins. Hickory handles. Black finish, plain eye.



Numbers	0	1	2	3	4	5	6
Weight, each, lbs.....	1⅛	1⅝	2	2½	3	3½	4½

MACHINISTS' RIVETING HAMMERS

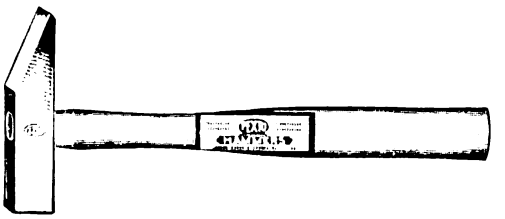


Drop forged. Hardened face and pein. Handle of second growth white hickory. Round poll. Full polished.

Numbers	0	1	2	3	4	5	6	7
Weight, each, oz.....	4	7	9	12	15	18	22	26

TINNERS' HAMMERS

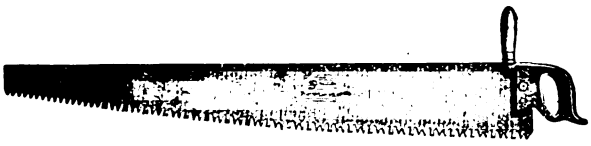
Drop forged. Hardened face and pein. Second growth hickory handle. Square poll. Full polished.



Numbers	1	2	3	4	5
Size Face, inches.....	1⅛	1	⅞	¾	⅝
Weight, each, oz.....	20	16	12	8	4

Digitized by Google

Simonds Saws

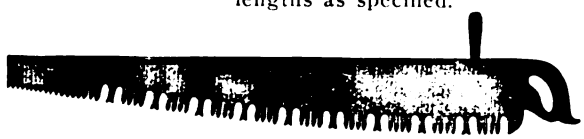


Lance tooth. Crescent ground. May be used as two-man saw by placing vertical handle at opposite end.

No. 1225. One-man cross-cut saw, complete with handles. Made in 3', 3½', 4', 4½', 5', 5½' lengths as specified.

Crescent ground. Two teeth to each raker. May be used as two-man saw by placing vertical handle at opposite end.

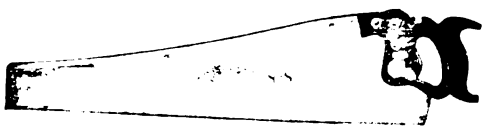
No. 1115. One-man cross-cut saw, complete with handles. Made in 3', 3½', 4', 4½', 5', 5½' lengths as specified.



Has lance tooth, four cutters to each rake.

No. 122. Two-man cross-cut saw without handles. Saws are 15x20 gauge in 4', 4½', 5', 5½' lengths and 14x19 gauge in 6', 6½', 7', 7½', 8' lengths. Specify length when ordering.

HAND SAWS



Bay State Quality

No. 125. Bay State. Skew back.
No. 126. Bay State. Straight back.

Furnished in 18", 20", 22", 24", 26" and 28". Hand, panel or rip.

Simonds Blue Ribbon

No. 3020. Narrow, skew back. 26" hand, 7, 8, 9, 10 or 11 point.

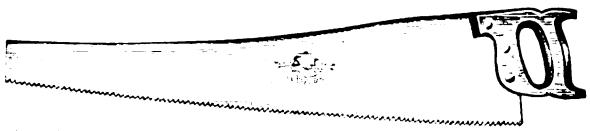
No. 3720. Narrow, skew back. 22" panel, 9, 10, 11 or 12 point; 24" panel, 8, 9 or 10 point; 26" hand, 7, 8, 9, 10 or 11 point; 26" rip, 5, 5½ or 6 point.

Simonds Blue Ribbon

No. 172. Skew back. Stock sizes 20" and 22" panel, 8, 9, 10, 11 or 12 point; 24" panel, 8, 9 or 10 point; 26" hand, 6, 7, 8, 9 or 10 point; 24" rip, 6 point; 26" rip, 5, 5½ or 6 point.

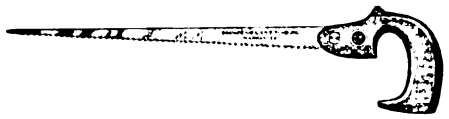
Crucible Steel

No. 102. Skew back. Full width. Stock sizes 18", 20", 22" panel, 8, 9, 10, 11 or 12 point; 24" panel, 7, 8, 9, 10, 11 or 12 point; 24" rip, 5½ or 6 point; 26" hand, 6, 7, 8, 9, 10, 11 or 12 point; 26" rip, 5, 5½ or 6 point.



Cast Steel

No. 46. Osceola, skew back, narrow. Furnished in 16", 18", 20", 22", 24", 26" and 28" lengths. Hand, panel or rip.



COMPASS SAWS

Adjustable

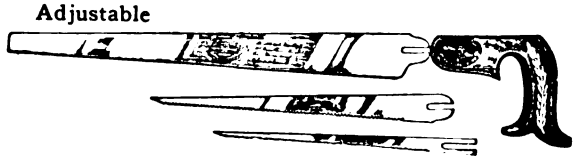
No. 870. 10", 12", 14" and 16" lengths.
No. 880. 12", 14" and 16" lengths.
No. 940. 12", 14" and 16" lengths.

NESTS OF SAWS

Adjustable

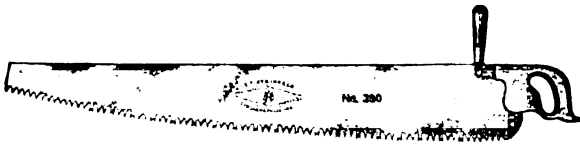
No. 790. Combining one each: 10" keyhole, 12" compass and 16" table blade.

No. 830. Combining one each: 10" keyhole, 12" compass and 18" nail cutting blade.



Digitized by Google

Atkins Saws



No. 390. One-man, tuttle tooth cross-cut saw.

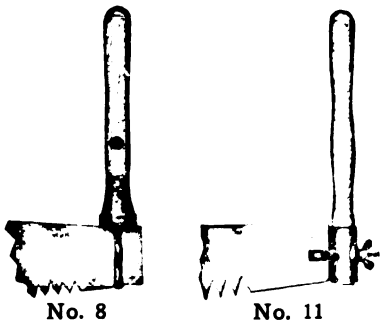
No. 397. One-man, common tooth cross-cut saw.

Either saw furnished in 2½′ to 6′ lengths by 6″ steps.

No. 330. Thin back, tuttle tooth two-man cross-cut saw, 14x16 gauge, special steel.

No. 337. Common tooth, two-man cross-cut saw, 14x16 gauge, special steel.

Furnished in 4′ to 8′ lengths as specified. Handles not included.



No. 8 No. 11

No. 8. Cross-cut saw handle, 10″ long, irrespective of loops. Loop of extra strong tensile strength steel. Black japanned. Malleable nuts. Furnished in pairs.

No. 11. Cross-cut saw handle, 14″ long. Reversible. Cast iron face plate and washer. High grade malleable bolt with lock rivet feature. Easily adjusted. Furnished in pairs.

Regular Pattern

Skew Back

No. 58. High quality cast steel, straight back, hand, panel or rip saw.

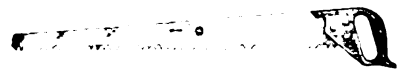
No. 59. Same as No. 58, except skew back.

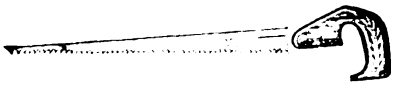
No. 53. High grade hand, panel and rip saw. Genuine silver steel blade, taper ground. Furnished in regular or ship point pattern.

No. 65. Similar to No. 53, except straight back, either regular or ship pattern.

Panel saws furnished in 16″ to 24″ lengths. Hand and rip saws 16″ to 28″ lengths. Specify number points to the inch.

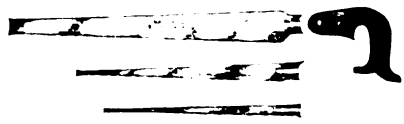
No. 17. Forester pruner saw. Furnished in 26″ lengths for trimming trees, cutting poles, planks, timbers, etc.





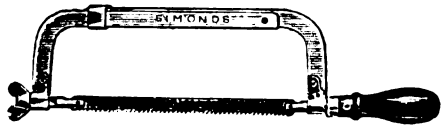
No. 9. Special compass saw. Silver steel. Interchangeable beech handle. Made with 10″, 12″, 14″ and 16″ blades.

No. 3. Nest of saws. Detachable handle, adjustable to three different angles. A compass and keyhole blade and metal cutting blade are included. The nail cutting blade is exceedingly hard for cutting nails, pipe, conduit or any other metal encountered. Taper ground so that it clears itself readily.



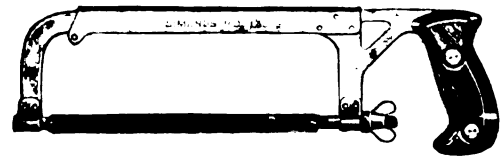
Digitized by Google

Hack Saw Frames



Adjustable for 8" to 12" blades. Depth of cut, 2½". Blade can be faced in four directions.

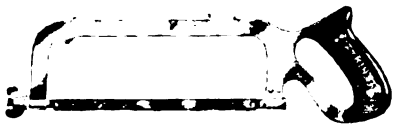
No. 237. Adjustable hack saw frame with 8" blade.



Pistol grip, so arranged as to protect the operator's hand from injury by jamming it against the work should a blade break while using. Adjustable for blades 8" to 12" long. Depth of cut 2½".

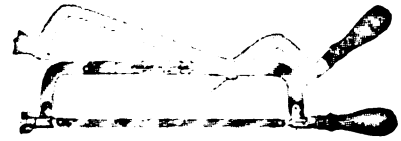
No. 2135. Adjustable hack saw frame with 8" blade.

No. 2136. Adjustable hack saw frame with 8" blade, same as No. 2135, except depth of cut is 4" and it has extra heavy back.



Cold rolled steel frame ¾" wide by $\frac{5}{16}$" thick. Ridged. Adjustable for 8" to 12" blades. Hard rubber, non-breakable handle, "Easy-Grip" pattern; hung low to increase the cutting power for each stroke. Depth under back to cutting edge of blade, 3".

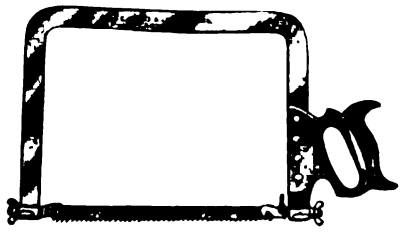
No. 10. Atkins adjustable hack saw frame with 8" blade.



High grade steel, ¾" wide by $\frac{5}{32}$" thick, heavily nickeled, highly polished. Takes blades 8" to 12" long. Blade can be used in four different directions. Enameled handle.

No. 1. Atkins Hoosier adjustable hack saw frame with 8" blade.

ATKINS RAIL HACK SAW FRAMES



	Under Back Inches	Length Blade Inches	Weight Each Pounds
No. 1	7	9	3⅛
No. 1½	7	12	4
No. 2	10	12	5⅜
No. 3	10	14	5¾
No. 4	10	17	6½
No. 5	10	18	6⅝
No. 6	10	20	7

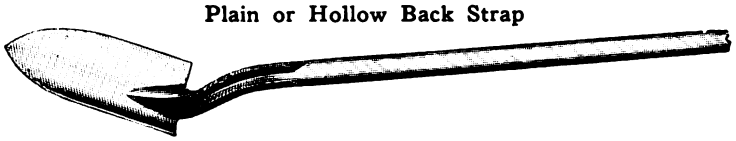
A frame of Special Spring Steel 1¼ inches wide, ¼ inch thick, adapted to heavy cutting such as rails, I-beams, girders, etc. Made in seven sizes to handle a wide range of work. Nos. 4, 5 and 6 have handles on both ends. A double turnbuckle secures a heavy tension on the blade.

Seasoned hardwood handles, polished edges, fastened by four brass screws.

Digitized by Google

Long Handle Shovels

Plain or Hollow Back Strap



No. 132R. No. 2 size, round point. No. 112S. No. 2 size, square point.
Both style shovels made in four grades, A1, B2, C3 and D4.
When ordering, specify grade, style of back and size wanted.

"D" HANDLE SHOVELS

Plain or Hollow Back

No. 122RB. No. 2 size, round point. No. 122SB. No. 2 size, square point.
Both the round and square point shovels are made in sizes 2, 3 and 4, and in four grades, A1, B2, C3 and D4.
When ordering, specify grade, style of back and size wanted.

SPECIAL "D" HANDLE SQUARE POINT SHOVELS

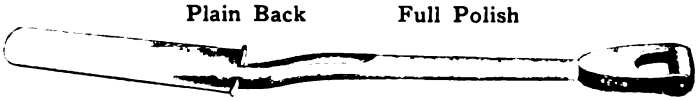
Plain Back

No. 92. No. 2 size, track square point. No. T92. No. 2 size, tamping square point.
Made in extra quality grade only. Railroad Special and in sizes 2, 3 and 4.
When ordering, specify style and size wanted.

No. B100. No. 2 size, brick square point. No. S100. No. 2 size, sewer square point.
Made smaller than No. 2 size and called "Special." Two grades, A1 and B2.
When ordering, specify grade and style wanted.

DIGGING AND DRAINING SPADES

Plain Back **Full Polish**



No. 182DS.	14-inch blade, digging.	No. 172DS.	14-inch blade, draining.
No. 183DS.	16-inch blade, digging.	No. 173DS.	16-inch blade, draining.
No. 184DS.	18-inch blade, digging.	No. 174DS.	18-inch blade, draining.
No. 185DS.	20-inch blade, digging.	No. 175DS.	20-inch blade, draining.
No. 186DS.	22-inch blade, digging.	No. 176DS.	22-inch blade, draining.
No. 187DS.	24-inch blade, digging.	No. 177DS.	24-inch blade, draining.

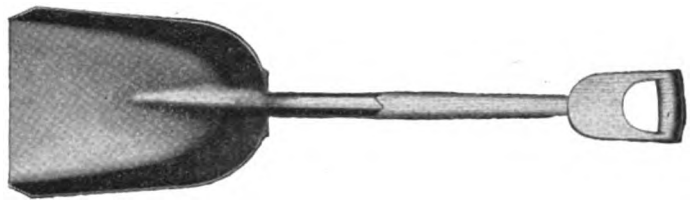
Made in three grades, A1, B2 and C3.
When ordering, specify style and grade wanted.

We Can Furnish All Sizes, Styles and Grades of Shovels, Scoops, etc., for All Kinds of Construction and General Work

Digitized by Google

Back Strap and Hollow Back Scoops

"D" or Long Handle **Locomotive Type**



No. 7102.	No. 2 D handle.	No. 7112.	No. 2 long handle.
No. 7103.	No. 3 D handle.	No. 7113.	No. 3 long handle.
No. 7104.	No. 4 D handle.	No. 7114.	No. 4 long handle.
No. 7105.	No. 5 D handle.	No. 7115.	No. 5 long handle.
No. 7106.	No. 6 D handle.	No. 7116.	No. 6 long handle.
No. 7107.	No. 7 D handle.	No. 7117.	No. 7 long handle.
No. 7108.	No. 8 D handle.	No. 7118.	No. 8 long handle.
No. 7109.	No. 9 D handle.	No. 7119.	No. 9 long handle.
No. 7110.	No. 10 D handle.	No. 7120.	No. 10 long handle.

Both the "D" handle and long handle scoops are made in two styles, Eastern and Western pattern. Four grades, A1, B2, C3 and D4.

When ordering, specify grade, style of back and size.

LONG HANDLE TELEGRAPH DIGGING SPOON

Extra Heavy Straight Handle, Flat Toe, W. U. Pattern

22-inch Long Front and Back Polished Straps, Seasoned Hardwood Handles

	Size	Weight Per Dozen
No. 440	7-foot	95 lbs.
No. 441	8-foot	105 lbs.
No. 442	9-foot	125 lbs.

LONG HANDLE TELEGRAPH DIGGING SPOON

Extra Heavy Straight Handle. Eastern Pattern

22-inch Long Front and Back Polished Straps, Seasoned Hardwood Handles

	Size	Weight Per Dozen
No. 450	7-foot	95 lbs.
No. 451	8-foot	105 lbs.
No. 452	9-foot	125 lbs.

Shovel blades are made of No. 10 gauge steel with reinforcing straps integral with the blade, extending up on the handle and riveted through it. Handles are made of seasoned timber of ample size for strength.

Digitized by Google

Long Handle Telegraph Shovels

Round Bent Point Western Union Pattern—22-inch Long Front and Back Straps Hardwood Seasoned Handles

	Size	Weight Per Dozen
No. 430	7 feet	95 lbs.
No. 431	8 feet	110 lbs.
No. 432	9 feet	115 lbs.

These shovels are made of a select grade of crucible steel, especially adapted for that purpose. They have seasoned handles, heavy and sound stock. The handles have the popular "Western Union" bend, and are well reinforced with long steel straps, the straps are made in one piece with the blade. They are adapted for the very hardest service and are giving the best satisfaction.

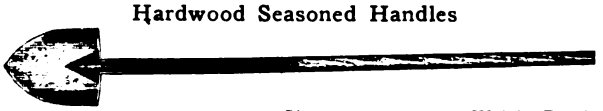
LONG TELEGRAPH SHOVEL HANDLES

Hardwood Seasoned Handles. Western Union Pattern

	Size	Weight Per Dozen
No. 450	7-foot handles	54 lbs.
No. 451	8-foot handles	60 lbs.
No. 452	9-foot handles	70 lbs.

LONG HANDLE TELEGRAPH SHOVELS

Round Point Straight Handles—22-inch Long Front and Back Straps Hardwood Seasoned Handles



	Size	Weight Per Dozen
No. 433	7 feet	100 lbs.
No. 434	8 feet	110 lbs.
No. 435	9 feet	115 lbs.

These shovels are the same quality as above, but have an entirely straight handle. This feature is of advantage in working in the bottom of deep post holes or in stiff soils and in confined places. The handle is protected by long front and back straps integral with the blade; the straps run along the handle for a length of 22 inches. This not only protects the handle from chafing, but strengthens it at a point where it has to sustain great strains.

SHOVEL OR SPOON HANDLES

Hardwood Seasoned Handles. Straight Patterns

	Size	Weight Per Dozen
No. 450A	7-foot handles	54 lbs.
No. 451A	8-foot handles	60 lbs.
No. 452A	9-foot handles	70 lbs.

Digitized by Google

Post Hole Diggers

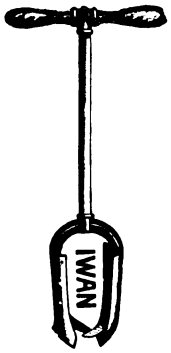
EUREKA

With Split Handles

	Size	Weight Per Dozen
No. 396D	4-foot	120 lbs.
No. 396H	7-foot	135 lbs.

HERCULES

No. 396J	4-foot	115 lbs.

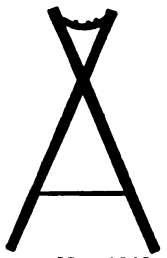


IWAN'S PATENT POST HOLE AUGER

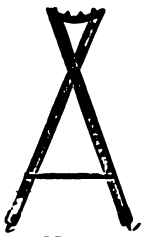
8 inch, 4 feet over all
10 inch, 4 feet over all
12 inch, 6 feet over all
14 inch, 6 feet over all

Strength and time saved by using Iwan Post Hole Auger, which makes a hole smoothly and quickly, empties easily and is very durable. Three full turns and it is full of earth.

POLE SUPPORTS



No. 1842



No. 3930

No. 3950

JENNEY PATTERN POLE SUPPORTS

Collapsible Type

		Size	Weight, Each
No. 1842	Collapsible	6-foot Wood Jenney Pattern	39 lbs.
No. 1843	Collapsible	7-foot Wood Jenney Pattern	57 lbs.
No. 1844	Collapsible	8-foot Wood Jenney Pattern	62 lbs.

Standard Telephone Type

		Size	Weight, Each
No. 3930	Standard	6-foot Wood Jenney Pattern	40 lbs.
No. 3940	Standard	7-foot Wood Jenney Pattern	45 lbs.
No. 3941	Standard	8-foot Wood Jenney Pattern	50 lbs.

MULE PATTERN POLE SUPPORT

Telegraph W. U. Type

	Size	Weight, Each
No. 3950	6-foot Wood Mule Pattern	24 lbs.
No. 3960	7-foot Wood Mule Pattern	26 lbs.
No. 3961	8-foot Wood Mule Pattern	27 lbs.

Digitized by Google

Timber Lug or Carrying Hook

Telephone-Telegraph Type

	Size	Average Weight Per Dozen
No. 405	4-foot maple handle	135 lbs.
No. 406	5-foot maple handle	150 lbs.
No. 407	6-foot maple handle	160 lbs.

The handles are turned from selected hardwood, are 3 inches square in center, gradually tapering at both ends, and reinforced with steel plates, which are securely riveted. The hooks are forged of tool steel, ground and tempered and are securely riveted to malleable iron casting. Hooks are attached to handle by machine bolt so they will swivel freely. A very heavy tool for general construction work.

TIMBER LUG OR CARRYING HOOK

	Size	Average Weight Per Dozen
No. 405A	4-foot	96 lbs.
No. 406A	5-foot	120 lbs.

The hooks are hung in swivel so they will adjust themselves to the size of the pole or log. They are made of steel and have chisel points. The swivel and clip are made of malleable iron. Carrier will be found very useful in bridge, pole line and general railroad construction; in fact, in any work where timbers are to be handled. They reduce to a minimum the heavy lifting and tugging necessary when these tools are not employed.

CANT HOOK

	Size	Average Weight Per Dozen
No. 399	4½-foot with hickory handle	90 lbs.
No. 399O	4½-foot with maple handle	90 lbs.

Fitted with malleable toe ring and clasp. Has steel forged hook. The point is ground and tempered. A very substantial cant hook for all around work.

PEAVY

	Size	Average Weight Per Dozen
No. 390	4½-foot with hickory handle	110 lbs.
No. 397	4½-foot with maple handle	110 lbs.

Equipped with malleable socket, securely riveted; forged steel pike and hook, tempered and hardened.

Digitized by Google

Showing How Cross Piece Can Be Detached for Removing Coil of Wire

"Improved" Take-up Reel

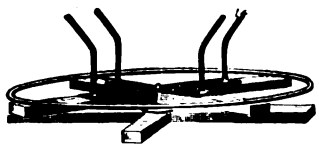
W. U. Type

	Size	Weight, Each
No. 387.	For 18-inch coil with single crank	62 lbs.
No. 387A.	For 21-inch coil with single crank	65 lbs.

Entire reel constructed of oak throughout. Solidly built, securely bolted and riveted. The cross sections are full mortised and bolted. The sides are steel-braced. The spool is reinforced with oval steel plates, securely held in place by screws, bolts and cotter pins. In addition to being so well constructed, this improved take-up reel has a separate guard base which slips over the shaft and fastens with a flat key, allowing wire to be removed quickly and easily. The axle is of forged steel. Bearings are lathe-turned. Equipped with steel crank, fitted with wooden handle. Made in two sizes, for 18 and 21-inch coils. A very substantial outfit for taking up wire in heavy construction work.

Same as Above with Double Crank

	Size	Weight, Each
No. 387B.	For 18-inch coil with double crank	66 lbs.
No. 387C.	For 21-inch coil with double crank	70 lbs.

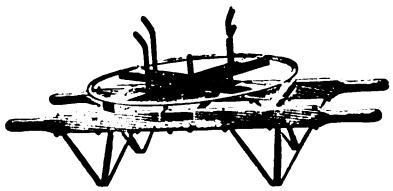


COMMON PAY-OUT REEL

No. 386A. Weight, each, 40 lbs.

Substantially built of hardwood and reinforced with steel plates. A good reel for the repair wagon.

We also furnish reel spools with turnpin and disk, without base, for wagon reels or for multiple stringing. Guard pins are adjustable for 12-inch, 18-inch or 24-inch coils.

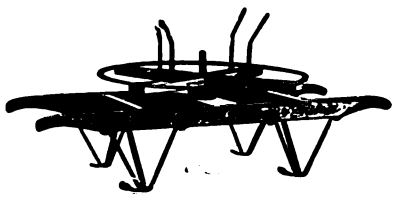


STANDARD PAY-OUT REEL ON BARROW

For Telephone Work

No. 385A. Weight, each, 80 lbs.

Constructed of hardwood and reinforced with steel plates. The barrow is supported by substantially made steel legs side braced and bolted through the wood. Built to stand hard usage. Guard pins are adjustable for 12-inch. 18-inch or 24-inch coils.



HEAVY PAY-OUT REEL ON BARROW

For General Construction Work

W. U. Type

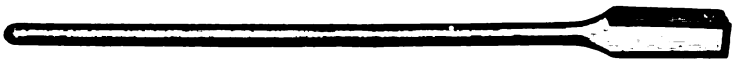
No. 385B. Weight, each, 90 lbs.

All wood parts are made of oak mortised and bolted together and reinforced with steel plates. Carried on strong well braced legs bolted through the wood. The guard pins are adjustable for 12-inch, 18-inch or 24-inch coils. Built to stand hard usage.

Digitized by Google

Tamping Bar

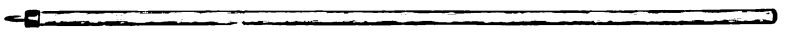
Wood Handle, Heavy Iron Shoe



	Size	Weight
No. 108	7-foot	12½ lbs. each
No. 109	8-foot	13½ lbs. each

Tamping end shod with 1¼x⅝-inch steel shoe riveted through select hardwood handle. A high grade tamping bar.

PLAIN PIKE POLE



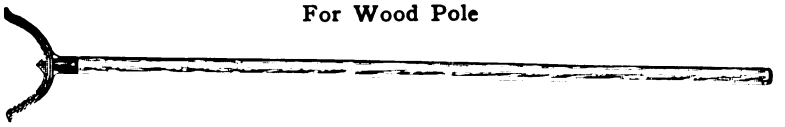
Handles made of Washington Fir, Pikes of Steel

	Size	Weight, Per Dozen
No. 414	12-foot 2 -inch handle	90 lbs.
No. 415	14-foot 2 -inch handle	110 lbs.
No. 416	16-foot 2 -inch handle	130 lbs.
No. 512	12-foot 2½-inch handle	100 lbs.
No. 514	14-foot 2½-inch handle	120 lbs.
No. 516	16-foot 2½-inch handle	140 lbs.
No. 518	18-foot 2½-inch handle	170 lbs.
	Extra Heavy	
No. 414B	12-foot 2½-inch handle	150 lbs.
No. 415B	14-foot 2½-inch handle	165 lbs.
No. 416B	16-foot 2½-inch handle	185 lbs.
No. 417B	18-foot 2½-inch handle	215 lbs.

Turned from selected second growth Washington Fir, and well seasoned. The pike is of forged steel, driven into the head and riveted to the ferrule, which adds strength and prevents the handle splitting.

GUARDED PIKE POLE OR RAISING FORK

For Wood Pole



Handles made of Washington Fir, Fork of Malleable Iron

	Size	Weight, Per Dozen
No. 697	12-foot 2 -inch handle	120 lbs.
No. 698	14-foot 2 -inch handle	140 lbs.
No. 699	16-foot 2 -inch handle	160 lbs.
No. 697A	12-foot 2¼-inch handle	160 lbs.
No. 698A	14-foot 2¼-inch handle	175 lbs.
No. 699A	16-foot 2¼-inch handle	195 lbs.
No. 699B	18-foot 2¼-inch handle	210 lbs.

The handles used in connection with this type of pole support are made of the same high grade selected lumber, as the pole shown above. The head arranged with an improved malleable fork, on which the pole rests. The socket has parallel sides which obviates the necessity of tapering the handle when inserting a new one. Handle securely riveted in socket, so that it cannot work loose.

Digitized by Google

Loy Digging Tool or Slicker

	Size	Weight, Each
No. 460	8-foot, 4x3/8 inch shoe	18 lbs.

For digging holes in hard soil. Heavy steel blade, with sharp hardened cutting edge, securely riveted to select hardwood handle.

TELEGRAPH CROW AND DIGGING BAR

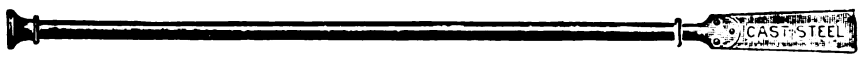
	Size	Weight, Each
No. 418B	1⅛x6 feet	22 lbs.
No. 418C	1⅛x7 feet	26 lbs.
No. 418	1⅛x8 feet	30 lbs.
No. 421C	1 x6 feet	18 lbs.
No. 421B	1 x7 feet	21 lbs.
No. 418A	1 x8 feet	24 lbs.

TELEGRAPH TAMPING AND DIGGING BAR

	Size	Weight, Each
No. 421E	1⅛x6 feet	23 lbs.
No. 421D	1⅛x7 feet	27 lbs.
No. 421	1⅛x8 feet	31 lbs.
No. 421G	1 x6 feet	19 lbs.
No. 421F	1 x7 feet	22 lbs.
No. 421A	1 x8 feet	25 lbs.

These bars are made of a high grade octagon crucible tool steel purposely selected and made up for us. This steel has high resisting qualities and elasticity. It is a high priced steel to use for digging bars, but its use is justified in the saving it will afford in work performed. A cheap digging bar that will bend at every strain is a time waster, and a drain on the wage account. The slight additional first cost is a mere nominality, and will pay compound interest every day this tool is used.

SPUD DIGGING TOOL AND TAMPING BAR



	Size	Weight, Each
No. 420	9-foot	19 lbs.

Handle of steel tubing. Steel blade riveted to handle.

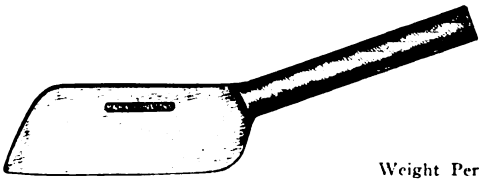
DOUBLE DUTY STEEL TAMPING BAR

	Size	Weight, Each
No. 430	8-foot	18½ lbs.

Handle of steel tubing. The tamping shoes of malleable iron securely fastened to the handle.

Digitized by Google

Cable Sheath Splitting Knives



		Weight Per Dozen
No. 379E		12 lbs.

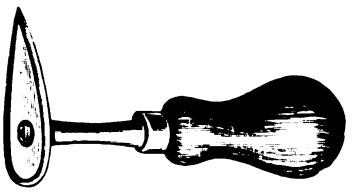
For splitting lead covered cable. Handle and blade are forged in one piece from crucible tool steel.

CABLE STRIPPER KNIFE

		Weight Per Dozen
No. 379A	3½-inch blade, length over all 8½ inches	2¼ lbs.

For stripping heavy insulated wire and cable. Has hardwood handle, which fits the hand comfortably. Blade securely riveted in handle, but rivet is deeply countersunk, eliminating chance of shock.

SHAVE HOOKS



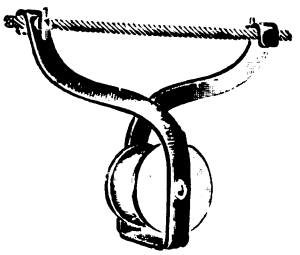
379C

379D

Made in two styles, one oval shaped and the other triangular. Used for scraping lead sleeves, pipe, cable ends, pot heads, etc.

		Weight Per Dozen
No. 379C	Oval Pattern	2½ lbs.
No. 379D	Triangle Pattern	2½ lbs.

"MATLOCK" CABLE ROLLER



By the use of the "Matlock" Cable Roller, the work of running aerial cable is greatly expedited. A suitable number of "Matlock" rollers are attached to the messenger wire, in the simple manner shown in the cut, fastened in place by the T handle screws. The cable is then placed on the maple rollers and carried on to any required distance. A great many feet of cable can thus be run with ease and in a short time. The maple roller has a metal bushing, extending beyond each end. This prevents wear on the roller and keeps it in the center of the frame. The frame is forged of mild steel.

No. 875	With Wooden Roller
No. 880	With Iron Roller

Digitized by Google

Cable and Wire Grips

These Cable Grips are proving their worth each day, by handling millions of feet of all types of aerial and underground cable, in every branch of construction work.

The perfect economy obtained by their use, in handling cable without damage to the sheath, or waste of any description, makes them premier cable tools.

The Single Eye is the type used for underground purposes, where a simple pulling operation is to be done, and is also used for pulling aerial wires or cables that cross pole tops.

The Double Eye Grip has the advantage that a hold can be taken at any point when slipped on from the end, and by releasing the grip by pulling the end opposite the eye or funnel shaped end, can be slid along to the next desired point of purchase or hold. It is especially used for pulling out cable already installed and tailing in. The Double Eye Split Grip is so constructed that it can be laced on at any point desired where the Grip cannot be applied at the end, and a hold is desired at a point intermediate. Its importance and usefulness cannot be over-estimated in handling live cables and taking up slack at turns in aerial construction.

It is also to be noted that the ability of the Wire Grip is not limited to a single wire, or to lead covered cable alone. It can be used to pull in a three-wire feeder, or a number of wires, such as would be required on a signal system. It is also to be noted that not a single inch of wire or lead covered cable is destroyed in the pulling operation, due to the application of the Grip.

Single Eye Grip

Double Eye Grip

Split Grip, Open

WIRE OR CABLE GRIP

Single Eye Grips

No. 124S. Size, 1x24 inches.
No. 224S. Size, 2x24 inches.
No. 324S. Size, 3x24 inches.

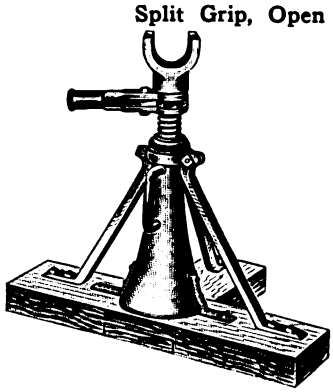
Double Eye Grips

No. 124D. Size, 1x24 inches.
No. 224D. Size, 2x24 inches.
No. 324D. Size, 3x24 inches.

Split Double Eye Grips

No. SE-124D. Size, 1x24 inches.
No. SE-224D. Size, 2x24 inches.
No. SE-324D. Size, 3x24 inches.

Can furnish any of the above style grips in lengths of 36 and 48 inches.



CABLE REEL JACK

No. 389. Weight, each, 82 lbs.

A pair of these jacks will support cable reels of any size while the cable is being run off. The forked head will hold a 2½-inch diameter shaft, and will swivel to any position. The cable may be raised or lowered while it is supported on the jacks. Screw is operated by inserting a bar in the hole of the ratchet head of the screw.

These jacks are fitted with 2x16-inch locomotive jack screws, braced on oak bases.

CABLE REEL BAR

Used in connection with the cable reel jack shown above. Made of special steel, hardened to assure strength.

No. 3891. 6-foot bar.

Digitized by Google

Lineman's Canvas Tool Bags

Equipped with Leather Handles, Sides and Bottom

No. 393A

No. 393A. 12-inch.
No. 393J. 14-inch.
No. 393E. 16-inch.
No. 393I. 18-inch.
No. 393. 20-inch.
No. 393W. 22-inch.
No. 393H. 24-inch.

Made of one piece No. 6 white duck, leather reinforced on four sides, steel frame and studs.

Can be equipped, when specified, with swivel to attach individual padlock, ordinary lock and key, inside pocket, frame with clasp, or shoulder strap, at slight additional cost.

WESTERN UNION STANDARD

Same as 393 bags, except has handles with solid top and shaped ends, double riveted to both frame and canvas and securely sewn to the canvas. W. U. Standard is 20 inches long, but these bags can be furnished in 18 and 22-inch sizes, with the additional equipment specified in the bags shown above.

No. 655A. 18-inch.
No. 655. 20-inch. "W. U. Std."
No. 655B. 22-inch.

No. 655

Electrician's and Inspector's Tool Bags

Made from Selected Harness Leather

No. 393R

No. 393R. 16-inch.
No. 393U. 18-inch.
No. 393S. 20-inch.
No. 393Y. 22-inch.
No. 393T. 24-inch.

No. 393B. 15 inches long, 12 inches high.
No. 393X. 18 inches long, 15 inches high.
No. 393K. 20 inches long, 15 inches high.

Bag with 1¼-inch shoulder straps made entirely of leather, tongue and buckle fastenings, convenient for inspector, wireman or lineman.

No. 393B

Digitized by Google

No. 40

Utility Tool Box

Zinc Covered. Steel Reinforced

No. 40. Utility Tool Box (specify length), complete with tray.

Made in 15", 17", 19", 21", 23" and 25" lengths by 8x8½" outside dimensions. Tray, 1½" deep.

A very substantial wood box, covered with non-corrosive sheet zinc. Edges bound with black enameled angle iron and reinforced with plated brass angles.

Has extra strong corners, lock hinges and catches with roomy ring handle.

Pole Climbers

EASTERN CLIMBERS

No. 382

No. 382. Eastern Climbers without straps with punched strap loops.

Made in sizes 15, 15½, 16, 16½, 17, 17½ and 18 inches long. Specify length when ordering. Straps are furnished only when specifically mentioned in the order.

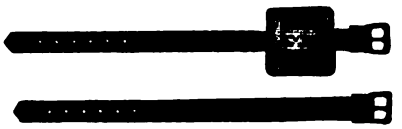
STRAPS FOR EASTERN CLIMBERS

No. 382A. Set of straps for Eastern Climbers.

The set consists of two upper straps with 4x4 plain leather pads and two lower straps, as shown in cut. Made of the very best harness leather.

No. 382B. Same as above, with sheep lined pads.

No. 382C. Same as above, with felt lined pads.



No. 382A

PADS FOR EASTERN CLIMBERS

No. 382

No. 382E. Sheep lined pads.

No. 382F. Felt lined pads.

No. 382G. Plain leather pads.

STRAPS FOR WESTERN CLIMBERS

No. 380A

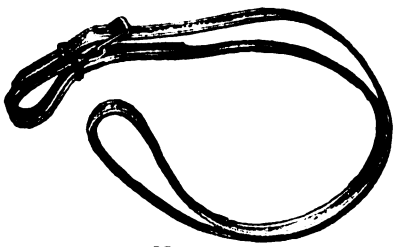
No. 380A. Set of straps for Western Climbers.

The set consists of two upper straps with plain oval pads and two lower straps as shown in cut. Made of very best steer hide harness leather.

No. 380D. Same as No. 380A, but with sheep lined pads.

No. 380E. Same as No. 380A, but with felt lined pads.

Digitized by Google



No. 377

Jack or Vise Strap

First Grade Steer Hide Harness Leather.
Tested Hardware

No. 377. Regular jack strap for vise, 1¼ inches by 5½ feet. Weight, each, 13 ounces.

No. 377A. Regular jack strap with either snap or clevis at one end for attaching grip; 1¼ inches by 5½ feet. Weight, each, 18 ounces.

COMBINED SAFETY AND JACK STRAP

No. 384B. Made of heavy, first grade steer hide harness leather, 6½ feet long and 1¾ inches wide, with heavy **tested** snap riveted to one end and removable **tested** roller snap at the other end. Strap may be adjusted by heavy **tested** roller buckle.

No. 384B

No. 385

SAFETY STRAPS

First Grade Steer Hide Harness Leather.
Tested Snaps and Buckles

No. 385. 1¾ inches by 6 feet, with plain snaps.

No. 386B. 2 inches by 6 feet, with plain snaps.

No. 385R. 1¾ inches by 6 feet, with roller snaps.

No. 386. 2 inches by 6 feet, with roller snaps.

No. 385R

No. 385S

No. 385S. 1¾ inches by 6½ feet, swivel roller snaps.

Digitized by Google

Lineman's Tool Belts

First Grade Steer Hide Harness Leather. Tested Hardware

Note—When ordering belts please state if wanted for 38, 40, 42, 44 or 46-inch waist.

No. 383A. 2½-inch belt, with rings.

No. 383A

No. 383C

No. 383C. 2½-inch belt, double, with rings.

No. 383E. 3½-inch belt, with rings.

No. 383E

No. 383F

No. 383F. 2¾-inch belt, Western Union style.

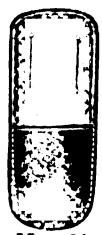
BELT POUCH AND PLIER POCKETS

No. 62. Belt pouch, for holding nails, staples, tags, etc.

No. 64. Plier pocket, to slip onto tool belt, open bottom.

No. 65. Plier pocket, to slip onto tool belt, closed bottom.

No. 62

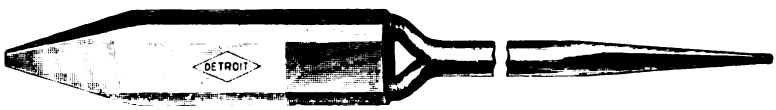


No. 64

No. 65

Digitized by Google

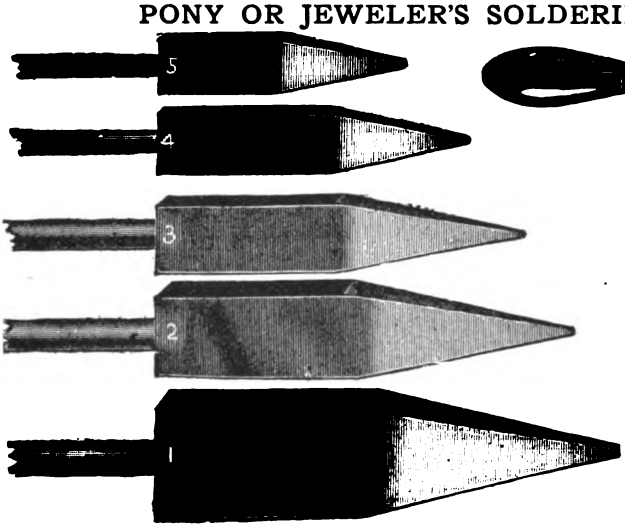
Standard Soldering Coppers



No. 1500	½ pound, each	No. 1506	3 pounds, each
No. 1501	¾ pound, each	No. 1507	4 pounds, each
No. 1502	1 pound, each	No. 1508	4 pounds, each
No. 1502A	1¼ pounds, each	No. 1510	5 pounds, each
No. 1503	1½ pounds, each	No. 1512	6 pounds, each
No. 1504	2 pounds, each	No. 1514	7 pounds, each
No. 1505	2½ pounds, each		

The weight given is that of each copper (not pair). Any of the above coppers fitted with handle, 15c net extra.

PONY OR JEWELER'S SOLDERING COPPERS



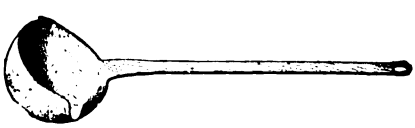
Designed especially for telephone and switchboard assemblers and adjusters. Forged and drawn out to the proper points for accurate work. Furnished with black ebonized handle. The illustrations (except the one above) show the actual sizes of the coppers. The cut above shows complete tool.

	Length	Weight Per Dozen
No. 55	8½ inches	1 lb.
No. 54	9 inches	1⅛ lbs.
No. 53	10½ inches	1¼ lbs.
No. 52	11½ inches	1½ lbs.
No. 51	12 inches	2 lbs.

MELTING POTS

No, 560. 5-inch cast iron pot.
No. 561. 6-inch cast iron pot.
No. 562. 8-inch cast iron pot.

No. 560



No. 555

POURING LADLES

No. 555. 2½-inch bowl.
No. 556. 3 -inch bowl.
No. 557. 4 -inch bowl.
No. 558. 5 -inch bowl.

Digitized by Google

"Dandy" Soldering Paste

No. 1287

DANDY SOLDERING PASTE is a quick, active, non-corrosive soldering flux, free from acid. It will not corrode a joint. In using this paste the joint can be made up, a small amount of paste applied and then be heated with soldering iron or by dipping in molten solder. For line wire joints DANDY PASTE is unexcelled as the paste can be applied when the joint is cold and upon heating the joint the paste flows into all crevices between the wires resulting in the proper fluxing of the joint which consequently will be well soldered.

No. 1287. Paste, 6 boxes to the pound.

Allen's Soldering Specialties

No. 039538

No. 039534

ALLEN "SODERING" STICKS

No. 039534. Size package, 1x5½ inches.

ALLEN "SODERING" PASTE

Will not corrode or injure in any way surfaces to which it is applied. Solder dipped into this paste is self-fluxing. A form of the Allen sticks.

No. 039537.	2-oz. tubes.
No. 039538.	2-oz. cans.
No. 039565.	4-oz. cans.
No. 039539.	½-lb. cans.
No. 039540.	1-lb. cans.
No. 039541.	5-lb. cans.
No. 039562.	50-lb. pail.
No. 039581.	500-lb. bbl.

Self-Fluxing Solder

No. 2827

ROSIN CORE FLUX SOLDER

No. 57A. 1-lb. spools, in wire form.
No. 57B. 5-lb. spools, in wire form.

Wire Form Solder

No. 57

No. 57. Half-and-half solder in wire form.

Digitized by Google

Tape

A.R.A. AND W.U. SPECIFICATIONS

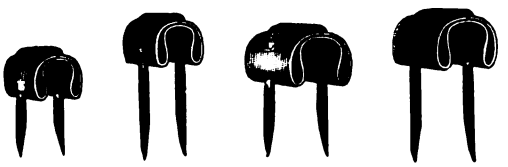
Friction

Plymouth friction tape, ¾-inch wide.

Rubber

Plymouth rubber tape, ¾-inch wide.

Insulated Staples



No. 1 **No. 3** **No. 5** **No. 6**

Designed for use on all low voltage circuits of interior wiring, such as telephone, telegraph, messenger call, annunciator and bell work.

These are a standard, square-shouldered staples, having good driving qualities.

The fibre insulation on these staples cannot come off in driving.

Some of Their Advantages

The double thickness of insulation, under the head of the staples, gives a large surface of contact with the wire, to stand mechanical strain.

The staples can be driven over two or more wires without danger of causing a cross.

The insulation on these staples gives an added protection from leaks or grounds on the wiring. When used in damp places it also protects the braiding on the wire from rust or corrosion of the staple.

Wiring can be done with Blake Staples in one-half the time required for cleat work.

The Blake insulated staples cost less than the screws alone used with porcelain cleat work.

Staples put up 100 in a package—10 packages (1000 staples) in a carton.

No. 1. Insulated staples for hard wood, for single and twisted pair wire.

No. 3. Insulated staples for general use, for single and twisted wire.

No. 5. Insulated staples for hard wood, for twisted 3-wire, and extra heavy pair wire.

No. 6. Insulated staples for general use, for twisted 3-wire, and extra heavy pair wire.

Digitized by Google

P. & B. Paints

Insulating

Preserving

P. & B. ELECTRICAL COMPOUND

Insulating

Dries almost instantly to a hard, glossy coat, thoroughly moisture, acid and alkali proof.

Used for insulating junction boxes, switchboards, battery and accumulator boxes, mouldings, shelves, underground cables, etc. No. 1, thinnest grade used where the greatest amount of penetration possible is desired. No. 2 is used for all ordinary purposes.

A special thinning liquid may be had for mixing compound of a special viscosity when required.

No. 1 and No. 2 put up in the following size containers:

Barrels of about 50 gallons.
Half-barrels of about 30 gallons.
Five-gallon cans.
Two and one-half-gallon cans, two in a case.
One-gallon cans, six in a case.
One-half-gallon cans, ten in a case.
Quart and pint cans.

P. & B. PRESERVATIVE PAINT

No. 1. Thinnest, dries almost immediately, spreads about 200 square feet per gallon.

No. 2. Standard grade, dries in about one-quarter of an hour, spreads about 150 square feet per gallon.

No. 3. Heavy bodied, dries in about half hour, spreads in the neighborhood of 100 square feet per gallon. For submerged work.

Excellent for pipes, coils, conductors and for lining vats, tanks, barrels and casks, for protecting floors, sills and other parts of stock, dairy and refrigerator cars, and for all surfaces subject to the action of water, brine, acid, etc. Especially adapted for work around smelters and cyanide plants; cold storage and ice plants, etc. The heavy grade is especially adapted for waterproofing brick work, cement and concrete and for all submerged or underground work.

A special thinning liquid may be had for mixing paint of a special viscosity when required.

No. 1, No. 2 and No. 3 put up in the following size containers:

Barrels of about 50 gallons.
Half-barrels of about 30 gallons.
Five-gallon cans.
One-gallon cans, six in a case.
One-half-gallon cans, ten in a case.
Quart cans, ten in a case.

Specify Grade When Ordering

Digitized by Google

No. 3 A. T. & T. Marline Cable Hangers

These Hangers are made in accordance with the A. T. & T. Co.'s specifications, and we guarantee them to comply with those specifications in every respect.

All sizes are made of three-strand Houseline. This Houseline is the best that we are able to obtain from cordage manufacturers. It is made from double dressed American hemp, long line, selected material, thoroughly tarred. The fibers in this material are very long and coarse, giving it the strength and durability found in no other Houseline.

The hooks are made from No. 9 spring steel wire and are **regalvanized by hot dip process after being formed,** thus making them practically rust-proof. The galvanizing is guaranteed to comply with the requirements of the Standard chemical test.

Size	Length of Loop	Hook	Material	Weight Per 1000
25 Pair	9″	No. 9	3-Ply Houseline	35 lbs.
50 Pair	11″	No. 9	3-Ply Houseline	37 lbs.
75 Pair	12″	No. 9	3-Ply Houseline	38 lbs.
100 Pair	14″	No. 9	3-Ply Houseline	40 lbs.
150 Pair	15″	No. 9	3-Ply Houseline	42 lbs.
200 Pair	16″	No. 9	3-Ply Houseline	45 lbs.

No. 1 Marline Cable Hangers

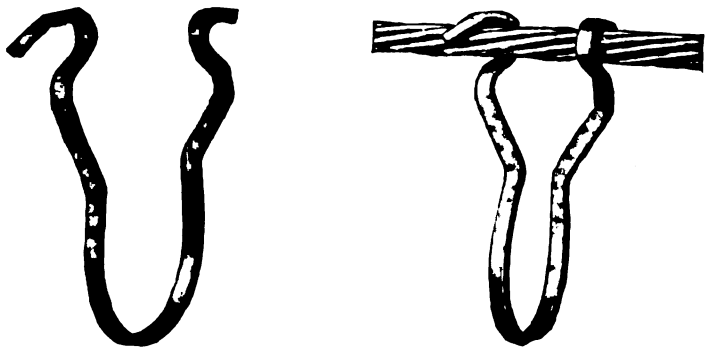
Our No. 1 grade has been used by the telephone trade for years and has given excellent satisfaction. The smaller sizes are made from two-ply Marline and the larger from three-ply Houseline.

The hooks are made of No. 9 steel wire, tinned.

Size	Length of Loop	Hook	Material	Weight Per 1000
25 Pair	9″	No. 9	2-Ply Marline	30 lbs.
50 Pair	11″	No. 9	2-Ply Marline	33 lbs.
75 Pair	12″	No. 9	2-Ply Marline	34 lbs.
100 Pair	14″	No. 9	3-Ply Houseline	40 lbs.
150 Pair	15″	No. 9	3-Ply Houseline	42 lbs.
200 Pair	16″	No. 9	3-Ply Houseline	45 lbs.

Digitized by Google

National One-Hand Locking Cable Rings



National one-hand Locking Cable Rings are easily attached to the messenger strand with one hand. Linemen do not tire even when placing rings steadily for a full day.

These rings have extraordinary strength and durability. They grip the messenger with two prongs, which form a tension that holds the grip of the prongs so tight that they positively cannot slip. The harder the pull the tighter the grip.

Wide opening between the prongs make these rings especially desirable and useful in re-clipping.

Rings are made from a high grade quality steel and galvanized by hot dip process, guaranteed to stand the standard Four Immersion test.

Made in 2 in., 2½ in., 3 in., and 3½ in. sizes.

National Junior Cable Rings

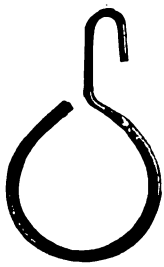
The National Junior Cable Ring is identical with the larger national rings described above, except that they are made in 1½ in. and 2 in. sizes from high carbon steel wire.

They duplicate in every way the strength and gripping power of the larger rings.

Digitized by Google

Aerial Cable Rings

For Suspending Aerial Cable and Bridle Wires



Single Hook Standard Type

Single hook standard and lapped type rings are used for bridle wire and small cables.

Double hook rings should be used for 50 pair and larger sizes of cable.

Method of Installing

The rings are fastened to the messenger strand by means of a special tool which crimps the hooks firmly to the strand. The lineman doing this work inserts a small pilot line which is used to pull through the regular running rope. The cable is then pulled through the rings by means of a team or car.

Single Hook Lapped Type

Material Used in Manufacture

The rings are made of a high grade quality of mild steel. They are galvanized by hot dip process after they are formed. The galvanizing is smooth and guaranteed to comply with standard specifications.

As Cable Hangers

The rings are strong and serviceable. They are neat in appearance and allow cable plenty of freedom for expansion and contraction.

Double Hook Type

Single Hook

	Approximate Shipping Weight Per 1000
1¾" Standard Type	60 lbs.
1¾" Lapped Type	60 lbs.

Double Hook Type

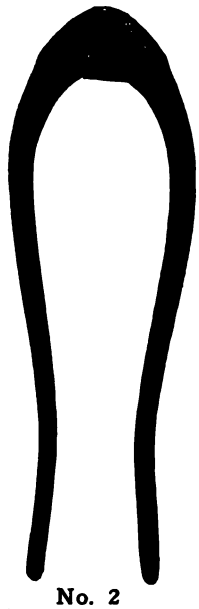
1¾"	75 lbs.
2"	75 lbs.
2½"	95 lbs.
3"	100 lbs.
3½"	125 lbs.

Digitized by Google

Crimping Pliers

For Attaching Aerial Cable Rings

No. 1
Small Size



No. 2
For 2½" Rings
or Larger

Used for crimping galvanized aerial cable rings used in connection with suspension strand. Handles are bowed so as to give proper clearance in handling all styles of rings.

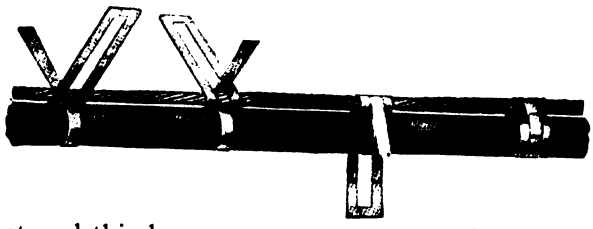
They are drop forged and are strong and light, making them easy to handle.

No. 1 size is intended for use on 1¾ and 2 inch rings.

No. 2 size for 2½ and larger rings.

No. 1. Small size Crimping Pliers.
No. 2. Large size Crimping Pliers.

Davidson Cable Hanger



The Davidson Cable Hanger is made from heavy gauge sheet zinc which does not corrode or cause chemical action which will injure the cable.

By holding the cable close to the messenger strand this hanger overcomes most of the vibration to which a loosely hung cable is subjected.

When used with lead sheathed cable the double tie around the messenger and cable electrically bonds the cable to the messenger at each hanger, so that punctures, due to insufficient bonding, do not occur. On account of the large surface supporting the cable at each hanger the lead sheath does not dent, crystallize or crack at points of contact.

No tools are necessary with this hanger and cablemen tie in about 20 per cent more cable per day with this type of hanger than with marline or rings.

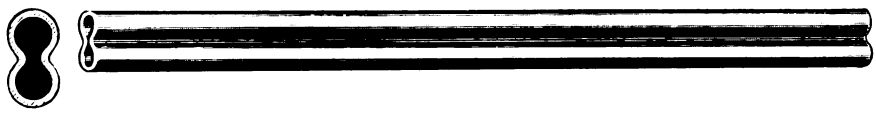
No. 1. For $\frac{5}{16}$" strand and ¾" cable.
No. 2. For ⅜" strand and 1⅛" cable.
No. 3. For ⅜" strand and 1⅝" cable.
No. 4. For ⅜" strand and 2" cable.

Digitized by Google

Premier Seamless Wire Sleeves

McIntire Type

(ONE PIECE)



The trouble experienced where soldered joint sleeves were used cannot occur where Premier Seamless Wire Sleeves are installed, as they are made of drawn seamless tubing, having no soldered joints to open up when being twisted. Years of service under all manner of conditions have proven them to have maximum conductivity, durability, more than ample carrying capacity and tensile strength in excess of that of the wire.

No. 1200.	No. 4 B&S, 8	inches long.
No. 1201.	No. 6 B&S, 6¾	inches long.
No. 1203.	No. 8 B&S, 5½	inches long.
No. 1204.	No. 9 B&S, 5¼	inches long.
No. 1211.	No. 10 B&S, 4¾	inches long.
No. 1212.	No. 12 B&S, 4½	inches long.
No. 1213.	No. 14 B&S, 4	inches long.

Combination Copper Sleeves Made to Order in Standard Sizes
Half-Length Sleeves Furnished When Specified

Digitized by Google

Double Tube Copper Sleeves for Solid Wire

Number	Gauge No.	Diameter Wire Inches	Length, Inches	Weight, Pounds Per 1000
210	0000 B & S	.460	20	1400
211	000 B & S	.410	18	1025
212	00 B & S	.365	16	675
213	0 B & S	.325	14	550
214	1 B & S	.289	12	350
215	2 B & S	.258	9½	250
216	3 B & S	.229	8¾	190
217	4 B & S	.204	6	130
218	4 B & S	.204	8	160
219	5 B & S	.182	6	115
220	6 B & S	.162	6	100
221	7 B & S	.144	5¾	85
222	8 B & S	.128	5½	60
223	8 B W G	.165	6	100
224	9 B & S	.114	5¼	50
225	9 B W G	.148	5¾	85
226	10 B & S	.102	4¾	30
227	10 B W G	.134	5½	60
228	11 B W G	.120	5¼	50
229	12 B & S	.081	4½	23
230	12 B W G	.109	4¾	35
231	12 N B S	.104	4¾	30
232	14 B & S	.064	4	20
233	14 B W G	.083	4½	23
234	14 N B S	.080	4½	23
235	16 B & S	.051	4	18
236	16 B W G	.065	4	20
237	17 B & S	.045	4	15
238	18 B W G	.049	4	18

Double Tube Tinned Steel Sleeves for Iron Wire

240	8 B W G	.165	6¾	110
241	9 B W G	.148	5¾	90
242	10 B W G	.134	5½	65
243	12 B W G	.109	4¾	40
244	14 B W G	.083	4½	30
245	16 B W G	.065	4	25

Double Tube Tinned Copper Sleeves for Iron Wire

250	8 B W G	.165	6¾	90
251	9 B W G	.148	5¾	60
252	10 B W G	.134	5½	55
253	12 B W G	.109	4¾	35
254	14 B W G	.083	4½	30
255	16 B W G	.065	4	25

Combination Copper Sleeves Made to Order in Standard Sizes
Half Length Sleeves Furnished When Specified

Digitized by Google

Galvanized Steel Strand

Messenger Wire **Guy Wire**

Composed of Seven Wires Twisted Together

Standard

Diam. in Inches	Size of Wires	Approx. Wt. Per 1000 Ft.	Strength in Lbs.
1/2	8	517	7,400
7/16	10	399	5,700
3/8	11	296	4,250
5/16	12	205	3,200
1/4	14	121	1,900
3/16	16	73	1,150
5/32	17	51	870

Seimen's Martin

Diam. in Inches	Size of Wires	Approx. Wt. Per 1000 Ft.	Strength in Lbs.
1/2	8	517	12,100
7/16	10	399	9,350
3/8	11	296	6,950
5/16	12	205	5,350
9/32	13	164	4,250
1/4	14	121	3,150
3/16	16	73	1,900

High Strength

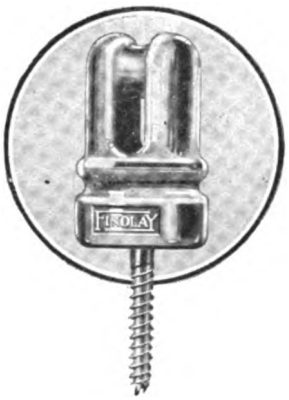
Diam. in Inches	Size of Wires	Approx. Wt. Per 1000 Ft.	Strength in Lbs.
5/8	5	813	19,100
9/16	6	671	15,700
1/2	8	517	12,100
7/16	10	399	9,350
3/8	11	296	6,950
5/16	12	205	5,350
9/32	13	164	4,250
1/4	14	121	3,150
3/16	16	73	2,850
1/8	19	32	1,330

Extra High Strength

Diam. in Inches	Size of Wires	Approx. Wt. Per 1000 Ft.	Strength in Lbs.
5/8	5	813	42,400
9/16	6	671	35,000
1/2	8	517	26,900
7/16	10	399	20,800
3/8	11	296	15,400
5/16	12	205	11,200
9/32	13	164	8,950
1/4	14	121	6,650
3/16	16	73	3,990
1/8	19	32	1,830

Digitized by Google

Porcelain Service Insulators



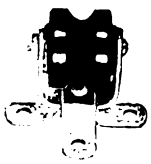
These insulators will be found most useful in running along sides of building, for drops, station platform lighting circuits and similar uses. Screw is guaranteed to hold, as it is held absolutely tight in the porcelain with a special cement. Double pointed, double threaded wood screws increase holding power and facilitate installation.

Furnished with galvanized screws unless brass screws are specified.

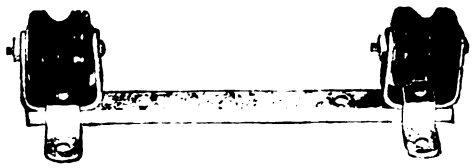
	Height Insulator	Diameter Insulator	Diameter Hole	Size Screw
No. 1929	3 in.	1⅞ in.	$\frac{7}{16}$ in.	No. 22
No. 1930	3⅜ in.	2⅝ in.	$\frac{13}{32}$ in.	No. 22
No. 1931	3 in.	2¼ in.	¾ in.	No. 22

Packed 50 to a box.

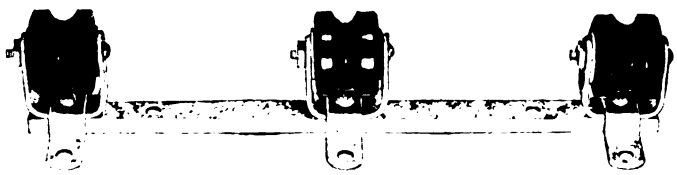
House Brackets



No. 1001



No. 1002



No. 1003

Maximum Strength—Long Life—Correct Design
Metal Parts Hot Galvanized to Prevent Rust
Spacer, ⅞ inch Channel—Yokes, ⅞ inch wide, ⅛ inch stock
Packed 25 to the carton.

These brackets are used extensively for running wires along brick and stone walls, etc., provide proper spacing and will anchor well in stone, concrete, brick, mortar and similar substances.

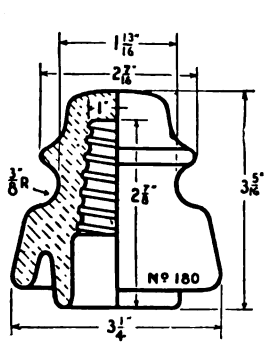
The Series 2000 House Brackets are similar to the 1000 Series, except that the insulators used are similar to the 1929 with machine screws for fastening to the channel. This facilitates the replacement of broken insulators and the addition of insulators to existing installations.

Descriptive literature furnished on request.

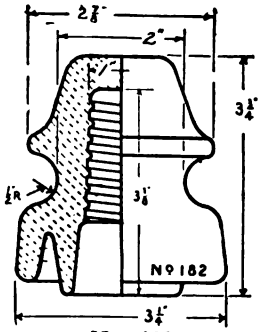
Digitized by Google

Porcelain Insulators

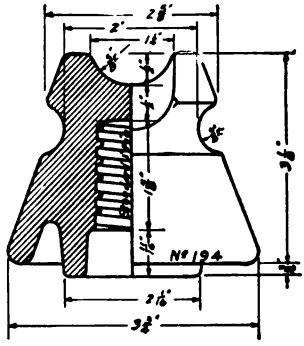
Wet Process



No. 180



No. 182



No. 194

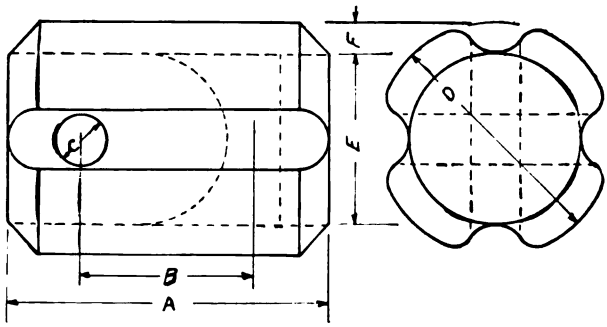
For Standard 1-inch Screw Thread Pins

Number	180	182	194
Nominal line voltage rating	6,600	6,600	6,600
Leakage distance (inches)	3½	3¾	5
Dry flash over voltage	40,000	50,000	55,000
Net weight each (ounces)	14	19	21
Number packed in boxes	100	100	100
Approximate weight per box (lbs.)	156	135	150

Porcelain Strain Insulators

Wet and Dry Process

Designed to Meet N. E. L. A. Specifications



	Dimensions in Inches							Ultimate Crushing
	A	B	C	D	E	F	Weight	Strength
No. 502	3¼	1¾	½	2⅜	1¾	5/16	14 oz.	10,000 lbs.
No. 504	3½	1 1/8	9/16	2¾	2⅛	⅜	22 oz.	15,000 lbs.
No. 506	5⅜	2⅞	⅞	3¼	2 5/16	11/32	42 oz.	20,000 lbs.

Packed in boxes unless order specifies "Packed in Barrels"

Digitized by Google

Glass Insulators

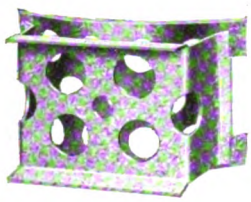
No. 19

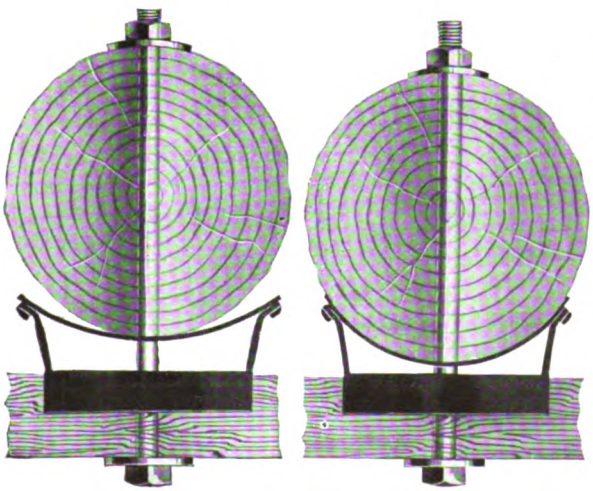
No. 42

The No. 19 Deep Groove Double Petticoat Glass Insulator has a leakage distance of 4⅛ inches and a wet arcing distance of 1 inch. Diameter at base, 3¼ inches; height, 3⅞ inches with ½ inch groove. The weight is 19 ounces each, 1350 pounds per 1000, packed. Standard package, 200.

The No. 42 Glass Insulator is the new Western Union style Double Petticoat, weighing 24 ounces each, 1710 pounds per 1000, packed. Standard package, 175. Diameter at base, 3¾ inches; height, 4⅛ inches with $\frac{5}{16}$ inch groove.

Steel Gains. Type No. 300





The Improved Steel Gain is a simple, strong, efficient device for attaching cross arms to poles. It lengthens the life of poles by doing away with cut gains which are responsible for much of the rapid deterioration of pole lines. It does away with the necessity of braces on cross arms not more than three feet in length.

As shown in the illustration at the left, the pole plate of the gain is formed with a radius larger than that of the pole. Tightening up on the through bolt causes the struts of the gain to press against the pole plate causing it to grip very tightly about the pole. Because of the closeness of the fit it is impossible for water to get between the pole plate and the pole, thus eliminating all possibility of rotting the strong outer fibres of the pole as is done by the cut gain.

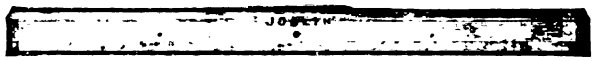
Steel gains are made for poles 6 to 8, 8 to 10 and over 10 inches.

When ordering, specify vertical dimension at center of cross arm for which they are to be used, and the approximate diameter of the poles (6-8, 8-10, over 10 inches).

Hot galvanized finish.

Digitized by Google

Pole Line Material



GENUINE WASHINGTON FIR CROSS ARMS

Standard Electric Light Size

		Weight Per 100
3¼"x4¼"x3'0"	2-pin	1020 lbs.
3¼"x4¼"x4'0"	4-pin	1360 lbs.
3¼"x4¼"x5'0"	4-pin	1700 lbs.
3¼"x4¼"x6'0"	4-pin	2040 lbs.
3¼"x4¼"x6'0"	6-pin	2040 lbs.
3¼"x4¼"x8'0"	8-pin	2720 lbs.

N. E. L. A. Size

3½"x4½"x3'2"	2-pin	1267 lbs.
3½"x4½"x5'7"	4-pin	2233 lbs.
3½"x4½"x8'0"	6-pin	3200 lbs.
3½"x4½"x9'2"	8-pin	3667 lbs.

Telephone Size

2¾"x3¾"x 42"	4-pin	875 lbs.
2¾"x3¾"x 62"	6-pin	1300 lbs.
2¾"x3¾"x 82"	8-pin	1700 lbs.
2¾"x3¾"x102"	10-pin	2125 lbs.
2¾"x3¾"x120"	12-pin	2500 lbs.

WOOD PINS

1¼"x 8" Standard Locust Pins, packed 250 per bag.
1½"x 9" Standard Locust Pins, packed 250 per bag.
1½"x12"—1" Top Painted Oak Pins, packed 125 per bag.
1½"x12"—1⅜" Top Painted Oak Pins, packed 125 per bag.
1¾"x12"—1" Top Painted Oak Pins, packed 100 per bag.
1¾"x12"—1⅜" Top Painted Oak Pins, packed 100 per bag.

Note—Bell Grade Locust or Unpainted Oak Pins furnished when specified.

WOOD BRACKETS

1½"x2" x10" Oak Brackets, weight, 500 lbs. per 1000.
1½"x2" x12" Oak Brackets, weight, 700 lbs. per 1000.
1½"x2¼"x12" Oak Brackets, weight, 800 lbs. per 1000.
1⅝"x2" x12" Oak Brackets, weight, 800 lbs. per 1000.
2" x2¼"x12" Oak Brackets, weight, 1000 lbs. per 1000.
2" x2⅜"x12" Oak Brackets, W. U. Std., weight, 1100 lbs. per 1000.

All sizes furnished painted or unpainted as specified, except W. U. Std., which is furnished unpainted only.

No. 1190

WESTERN UNION PINS

Forged from open hearth steel and made in accordance with Western Union specifications.

Wood top accurately turned from thoroughly air dried oak and impregnated with paraffin.

	Diameter, Inches	Length, Inches, Above Shoulder	Length, Inches, Below Shoulder
No. 1190	½	4¼	5
No. 1191	⅝	4¼	5

No. 1191

Digitized by Google

Pole Line Hardware

FLAT CROSS ARM BRACES

One end punched with 7/16 inch hole for 3/8 inch carriage bolt and other end punched with 9/16 inch hole for 1/2 inch lag screw. Special punchings to order.

Size, Inches	Weight Per 1000	Size, Inches	Weight Per 1000
1 x 1 9/16 x 20	1000 lbs.	1 7/32 x 3 7/32 x 34	2400 lbs.
1 x 1 9/16 x 22	1100 lbs.	1 7/32 x 3 7/32 x 36	2540 lbs.
1 x 1 9/16 x 24	1200 lbs.	1 1/4 x 1/4 x 20	1670 lbs.
1 x 1 9/16 x 28	1680 lbs.	1 1/4 x 1/4 x 22	1835 lbs.
1 7/32 x 3 7/32 x 20	1420 lbs.	1 1/4 x 1/4 x 24	2000 lbs.
1 7/32 x 3 7/32 x 22	1560 lbs.	1 1/4 x 1/4 x 26	2165 lbs.
1 7/32 x 3 7/32 x 24	1700 lbs.	1 1/4 x 1/4 x 28	2335 lbs.
1 7/32 x 3 7/32 x 26	1840 lbs.	1 1/4 x 1/4 x 30	2500 lbs.
1 7/32 x 3 7/32 x 28	1980 lbs.	1 1/4 x 1/4 x 32	2665 lbs.
1 7/32 x 3 7/32 x 30	2120 lbs.	1 1/4 x 1/4 x 34	2835 lbs.
1 7/32 x 3 7/32 x 32	2260 lbs.	1 1/4 x 1/4 x 36	3000 lbs.

GIMLET POINT OR FETTER DRIVE LAG SCREWS

Size, Inches	Weight Per 100	Size, Inches	Weight Per 100	Size, Inches	Weight Per 100
1/4 x 2	7 lbs.	3/8 x 3 1/2	11 lbs.	1/2 x 3 1/2	21 lbs.
1/4 x 2 1/2	8 lbs.	3/8 x 4	12 lbs.	1/2 x 4	23 lbs.
1/4 x 3	9 lbs.	3/8 x 4 1/2	13 lbs.	1/2 x 4 1/2	26 lbs.
1/4 x 3 1/2	10 lbs.	3/8 x 5	14 lbs.	1/2 x 5	28 lbs.
3/8 x 2 1/2	9 lbs.	1/2 x 2 1/2	16 lbs.	1/2 x 6	32 lbs.
3/8 x 3	10 lbs.	1/2 x 3	19 lbs.	1/2 x 7	37 lbs.

CARRIAGE BOLTS

Size, Inches	Weight Per 100	Size, Inches	Weight Per 100	Size, Inches	Weight Per 100
3/8 x 3	13 lbs.	3/8 x 5	19 lbs.	1/2 x 4 1/2	33 lbs.
3/8 x 3 1/2	15 lbs.	3/8 x 5 1/2	21 lbs.	1/2 x 5	36 lbs.
3/8 x 4	17 lbs.	3/8 x 6	22 lbs.	1/2 x 5 1/2	38 lbs.
3/8 x 4 1/2	18 lbs.	1/2 x 4	30 lbs.	1/2 x 6	41 lbs.

DOUBLE ARMING BOLTS

Size, Inches	Weight Per 100	Size, Inches	Weight Per 100	Size, Inches	Weight Per 100
1/2 x 12	86 lbs.	5/8 x 12	129 lbs.	3/4 x 12	177 lbs.
1/2 x 13	90 lbs.	5/8 x 14	143 lbs.	3/4 x 14	198 lbs.
1/2 x 14	93 lbs.	5/8 x 15	150 lbs.	3/4 x 15	209 lbs.
1/2 x 15	96 lbs.	5/8 x 16	157 lbs.	3/4 x 16	219 lbs.
1/2 x 16	100 lbs.	5/8 x 17	164 lbs.	3/4 x 17	230 lbs.
1/2 x 17	103 lbs.	5/8 x 18	171 lbs.	3/4 x 18	240 lbs.
1/2 x 18	107 lbs.	5/8 x 20	186 lbs.	3/4 x 20	261 lbs.
1/2 x 20	115 lbs.	5/8 x 22	200 lbs.	3/4 x 22	282 lbs.
1/2 x 22	123 lbs.	5/8 x 24	214 lbs.		

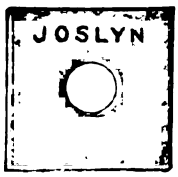
Digitized by Google

Pole Line Hardware

Machine or Through Bolts

Size, Inches	Weight Per 100	Size, Inches	Weight Per 100	Size, Inches	Weight Per 100
3/8x3	13 lbs.	1/2x11	69 lbs.	5/8x18	166 lbs.
3/8x3 1/2	15 lbs.	1/2x12	74 lbs.	5/8x20	182 lbs.
3/8x4	16 lbs.	1/2x13	80 lbs.	5/8x22	198 lbs.
3/8x4 1/2	18 lbs.	1/2x14	85 lbs.	5/8x24	214 lbs.
3/8x5	19 lbs.	1/2x15	90 lbs.	5/8x26	230 lbs.
3/8x5 1/2	20 lbs.	1/2x16	96 lbs.	3/4x10	150 lbs.
3/8x6	22 lbs.	5/8x8	86 lbs.	3/4x11	162 lbs.
1/2x4	32 lbs.	5/8x9	94 lbs.	3/4x12	173 lbs.
1/2x4 1/2	35 lbs.	5/8x10	102 lbs.	3/4x13	185 lbs.
1/2x5	37 lbs.	5/8x11	110 lbs.	3/4x14	196 lbs.
1/2x6	43 lbs.	5/8x12	118 lbs.	3/4x15	208 lbs.
1/2x7	48 lbs.	5/8x13	126 lbs.	3/4x16	219 lbs.
1/2x8	53 lbs.	5/8x14	134 lbs.	3/4x17	231 lbs.
1/2x9	58 lbs.	5/8x15	142 lbs.	3/4x18	242 lbs.
1/2x10	64 lbs.	5/8x16	150 lbs.	3/4x20	265 lbs.
		5/8x17	158 lbs.		

SQUARE WASHERS

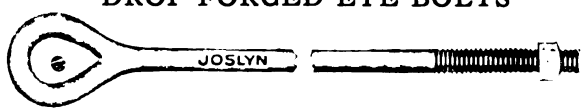


Size Washer, Inches	Diameter Hole, Inches	Size Bolt, Inches	Weight Per 100
2 x2 x1/8	9/16	1/2	13 lbs.
2 x2 x1/8	3/4	5/8	13 lbs.
2 1/4x2 1/4x1/8	11/16	5/8	25 lbs.
2 1/4x2 1/4x3/16	7/8	3/4	25 lbs.
3 x3 x3/16	3/4	5/8	45 lbs.
3 x3 x3/16	7/8	3/4	45 lbs.
3 x3 x1/4	3/4	5/8	58 lbs.
4 x4 x3/16	7/8	3/4	84 lbs.
4 x4 x1/2	1 1/8	1	215 lbs.
5 x5 x3/16	7/8	3/4	120 lbs.

ROUND WASHERS

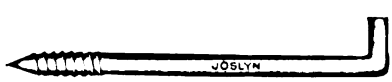
Outside Diameter, Inches	Diameter Hole, Inches	Size of Bolt, Inches Machine	Size of Bolt, Inches Carriage	Weight Per 100
1	7/16	3/8	..	16 lbs.
1 1/4	1/2	..	3/8	30 lbs.
1 3/8	9/16	1/2	3/8	42 lbs.
1 1/2	9/16	1/2	3/8	66 lbs.
1 3/4	11/16	5/8	1/2	75 lbs.
2	13/16	3/4	5/8	112 lbs.

DROP FORGED EYE BOLTS



Size, Inches	Weight Per 100	Size, Inches	Weight Per 100	Size, Inches	Weight Per 100
1/2x6	56 lbs.	5/8x8	113 lbs.	3/4x10	205 lbs.
1/2x8	69 lbs.	5/8x10	132 lbs.	3/4x12	233 lbs.
1/2x10	82 lbs.	5/8x12	151 lbs.	3/4x14	260 lbs.
1/2x12	95 lbs.	5/8x14	170 lbs.	3/4x16	287 lbs.
1/2x14	107 lbs.	5/8x16	189 lbs.	3/4x18	314 lbs.
1/2x16	119 lbs.	5/8x18	208 lbs.	3/4x20	341 lbs.
1/2x18	132 lbs.	5/8x20	227 lbs.	3/4x22	368 lbs.
1/2x20	144 lbs.	5/8x22	246 lbs.	3/4x24	395 lbs.

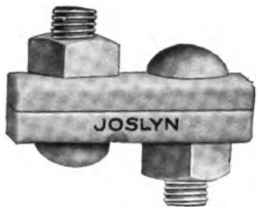
HOOK HEAD POLE STEPS



Size, Inches	Weight Per 1000	Standard Package
9/16x9	690 lbs.	350
5/8x9	830 lbs.	300
5/8x10	920 lbs.	250

Digitized by Google

No-Slip Guy Clamps

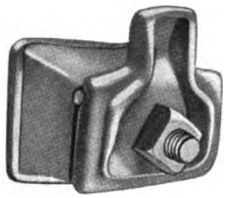


Two Bolt

Can't slip due to diagonal ridges in the grooves which fit the lay of the strand.

Three Bolt

	Size	Weight Per 100	Std. Pkg.
No. 1030	2-bolt, 3-inch	110 lbs.	200
No. 1031	3-bolt, 4-inch	150 lbs.	150
No. 1033	3-bolt, 6-inch, A. T. & T. Std.	270 lbs.	100



NON-BREAKABLE MESSENGER HANGERS

Made in two sizes. Malleable iron, hot galvanized.

	Size	Weight Per 100
No. 1045	For 5/16 inch strand and smaller	150 lbs.
No. 1046	For 3/8 inch strand and smaller	150 lbs.

UNIVERSAL MESSENGER HANGERS

Adaptable for curves and straight line work. Upper mounting hole 9/16 inch in diameter and lower hole 11/16 inch in diameter. Either lag screws or bolts, or one of each, may be used in mounting the hanger on the pole.

	Size, Stock, Inches	Weight Per 100	Standard Package
No. 1070-1	1/2x2	300 lbs.	100
No. 1071-2	3/8x1 3/4	240 lbs.	100

GUY HOOKS

Made in four sizes, all drilled to take 1/2-inch lags, except No. 1019, which is drilled for 5/8-inch lag screw.

	Size, Inches	Weight Per 100	Standard Package
No. 1016	1 1/4x1/4x3, one bolt	30 lbs.	500
No. 1017	1 1/2x3/8x3 1/2, one bolt	75 lbs.	400
No. 1018	1 1/2x3/8x6, two bolts	90 lbs.	250
No. 1019	1 3/4x3/8x4, one bolt	90 lbs.	300

CROSBY CLIPS

	Size, Inches	Weight Per 100		Size, Inches	Weight Per 100
No. 1038	1/4	31 lbs.	No. 1043	5/8	106 lbs.
No. 1039	5/16	31 lbs.	No. 1044	3/4	164 lbs.
No. 1040	3/8	35 lbs.	No. 1045	7/8	253 lbs.
No. 1041	7/16	74 lbs.	No. 1046	1	294 lbs.
No. 1042	1/2	75 lbs.	No. 1047	1 1/4	484 lbs.

Digitized by Google

SpeedWay Electric Drills

TYPE 50 INTERMITTENT DUTY DRILLS

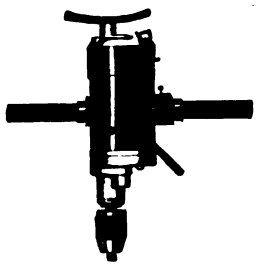
Type 50, shown, is an intermittent general utility ¼-inch drill.

Weight, 5 pounds. Motor, ⅛ H.P. Gear ratio, 4 to 1.

Housing drawn steel giving compactness.

Gears, spindle of Cramps gear bronze, pinion of steel.

Load speed, 1,200 R.P.M.



TYPE 60—½-INCH CAPACITY

Weight, 12 pounds. Motor, ¼ H.P. Gear ratio, 17 to 1.

Diameter, 4 inches. An exceptionally compact drill.

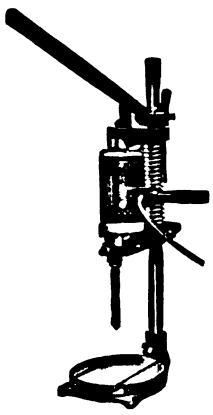
Motor housing, seamless steel tubing, semi-steel gear case.

Gears, alloy steel heat treated and ground.

(No. 1 Morse taper instead of chuck, if specified.)

Load speed, 400 R.P.M.

Heavy duty production drills shown on next page.



TYPE U L D DRILL STAND

Added Usefulness! U L D Drill Stand

The photograph at the left shows our new type U L D drill in use, held by a SpeedWay drill stand. This added feature allows you to take the drill to the job or take the job to the drill—gives you combination drill and drill press, which is essential in every shop, garage, etc.

All SpeedWay tools operate on A.C. and D.C. voltage—must be specified.

Note—Parts for all SpeedWay tools equal the price of the tool.

Digitized by Google

SpeedWay Electric Drills

HEAVY DUTY LINE

General Specifications on All Drills Shown Below

Universal motors, operating on A.C. and D.C.

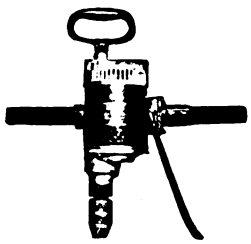
Ball bearings throughout. Housings of aluminum.

Gears of alloy steel heat treated and ground.

Brushes all square, impregnated pigtail carbon.

All capacities shown are for steel. Add 40% for wood.

TYPE 72—⅜-INCH TYPE 74—½-INCH TYPE 78—⅝-INCH



A noteworthy feature of these drills is their enormous power put into a minimum amount of space and weight. Their ability to stand the gaff is a proven factor. The specifications given below, apply to these three drills, which are the same in design, having a variation only in size, capacity and power.

Chuck is three jaw key type. Lead cord, rubber cable.

Breast plate or D. handle furnished as specified.

Pressure screw furnished at additional charge of $2.50.

Type 72. 110 or 220-volt, ⅜ inch capacity, 14 pounds, 600 R.P.M.

Type 74. 110 or 220-volt, ½ inch capacity, 18 pounds, 400 R.P.M.

Type 78. 110 or 220-volt, ⅝ inch capacity, 21 pounds, 350 R.P.M.

These drills operate from any lamp socket.

TYPE 80 DRILL—⅞-1¼-INCH CAPACITY

"Giant" is the term that can be most aptly applied to this drill.

Universal motor with approximate rating of ¾ H.P.

Furnished with No. 2 and No. 3 Morse taper sleeve. Any chuck extra.

Pressure screw and breast plate furnished with drill.

Load speed, 175 R.P.M. Weight, 45 pounds.

SPEEDWAY DRILL STANDS—FOR TYPE 72, 74, AND 78 DRILLS

This SpeedWay drill stand means that you are able to take care of bigger jobs in much less time. Photograph at left shows the heavy duty, Type 78 drill installed and ready for action, in one of the SpeedWay drill stands.

When ordering drill stands, specify type of drill.

Type 108 Grinder (Using "A" Arm-extra equipment)

TYPE 108 TOOL POST GRINDER

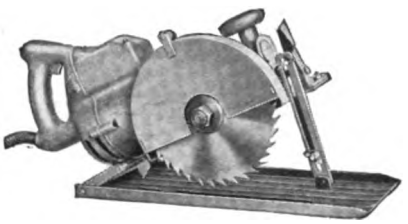
These precision grinders are built by tool experts for experts. A correct grinding speed, absolute accuracy, and ample power, being well planned and sturdily constructed.

The illustration at left shows the Type 108 Grinder equipped with an "A" arm for precision internal grinding, at a speed of from 30 to 40 thousand R.P.M.

Equipment consists of 8-foot lead-cord with plug, cutter grinding rest, compound wrench, cross feed lever. Speed of bare grinder 10,000 R.P.M. Ball bearing throughout. Aluminum housing, 1-2½ and 1-4½-inch wheel furnished with bare grinder. Universal motor.

Digitized by Google

SpeedWay Portable Electric Saws



TYPE 179

Weight is approximately 25 pounds. It is equipped with a ½ H.P. universal motor, carries an 8-inch saw blade, with a maximum cut of 2¾ inches. No load speed is 1500 R.P.M.

On this type saw, the convenient drop plate, hinged at the rear of the slipper plate, gives a sturdy, convenient depth gauge, as well as a complete guard. Blade is entirely covered and guarded until you release the catch on the drop plate and start sawing—the drop plate stopping at a predetermined depth.

Includes all equipment, with an 8-inch saw blade, all ready to attach to your lighting socket.

	Saw Blade, Inches	Current	Weight, Lbs.	Cut Cap. Inches	No. Load Speed
Type 176	6	A.C. and D.C.	15	1½	3600
Type 179	8	A.C. and D.C.	25	2¾	1500
Type 180	10	A.C. and D.C.	26	3¾	1500

In ordering, voltage must be specified.
Saw blades have special arbor hole.

SpeedWay Electric Hammers

TYPE 6—TYPE 4

Type 4 and 6

The popular type hammer for the contracting, installation trade, and maintenance men. With a drilling speed of 1 inch per minute in depth in the hardest concrete, and the ability to keep it up, this hammer has paid for itself on many jobs in a week's time. In the installation of elevators, elevator gates and enclosures, piping for plumbing, sprinkler system installation, setting chairs, stair treads, railing and ornamental iron, fire doors, in laying capets on concrete floors, drilling for wood plugs, setting machinery, etc.

Type 6. A.C. and D.C., 1-inch capacity, 26 pounds, 1800 blows per minute.

Type 4. D.C. only, 1-inch capacity, 25 pounds, 1800 blows per minute.

Each machine is equipped with a switch in handle, 8-foot lead cord, wrench, and one drill steel, as selected.

We also have a smaller hammer, Type 2, ½-inch capacity, 15 pounds weight, and a heavy mine type hammer, Type 9, weighing 75 pounds, for direct current only.

For overhead work we have stands.

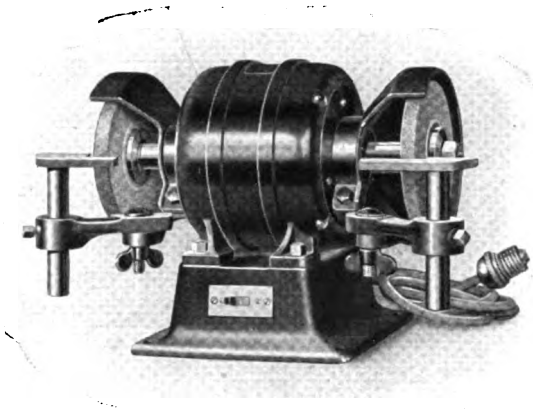
Star drills, Diamond drills, chisels, bush hammers, bull points, cape chisels, etc. Voltage must be specified; however, all hammers can be secured operating on both A.C. and D.C., except the Type 9.

Send for our special bulletin on SpeedWay hammers.

Digitized by Google

Grinding and Buffing Motors

BENCH TYPE



The life of electrical grinding machinery depends to a large extent upon the protection given the bearings and windings from grinding dust. The heart of these grinders is thoroughly protected by a dust-proof casing. A dust-proof oil cap is the door to an efficient and clean oiling system.

The grinder shaft operates on high grade ball bearings at both ends resulting in smooth operation. Should the ball bearings show wear over a period of time a simple screw adjustment to take up the play insures constant accuracy and long life.

The tool rests are quickly adjustable to any position by the mere turn of a thumb screw and pivot or stand rigidly as desired. A heavy guard over the wheels prevents particles of metal or dust flying toward the operator and minimizes the chance of accident.

An extra heavy cord and attachment plug makes the grinder portable. The latest type of electric switch is mounted in the base for easy control.

The grinders are made in two sizes: A ¼ horsepower motor which mounts 6-inch wheels of ⅝-inch face and a ½ horsepower machine which mounts 6-inch wheels of 1-inch face.

Standard equipment includes one coarse and one fine-grained wheel, wheel guards and tool rests.

	Horsepower	Volts	Cycle	Phase	Speed	Price	Wheels	Weight Net	Pounds Ship
No. 101*	¼	110	60	1	3400	$48.00	6x⅝	44	65
No. 102*	¼	220	60	1	3400	48.00	6x⅝	44	65
No. 103	¼	110	50	1	2800	60.00	6x⅝	44	65
No. 104	¼	220	50	1	2800	60.00	6x⅝	44	65
No. 105	¼	220	60	3	3400	60.00	6x⅝	44	65
No. 106	¼	220	50	3	2800	60.00	6x⅝	44	65
No. 107*	¼	115	D.C.	..	3400	48.00	6x⅝	44	65
No. 108*	¼	230	D.C.	..	3400	48.00	6x⅝	44	65
No. 109*	½	110	60	1	3400	68.00	6x1	59	85
No. 110*	½	220	60	1	3400	68.00	6x1	59	85
No. 111	½	110	50	1	2800	76.00	6x1	59	85
No. 112	½	220	50	1	2800	76.00	6x1	59	85
No. 113	½	220	60	3	3400	76.00	6x1	59	85
No. 114	½	220	50	3	2800	76.00	6x1	59	85
No. 115*	½	115	D.C.	..	3400	68.00	6x1	59	85
No. 116*	½	230	D.C.	..	3400	68.00	6x1	59	85

*Carried in stock for immediate shipment.

Digitized by Google

Turner Double Jet Blow Torches

FOR GASOLINE OR KEROSENE

Polished Brass Tanks

No. 148T

No. 148T TORCH

Has the famous Double Jet No. 92 burner which has a world-wide reputation for its extreme heat and absolute satisfaction.

One opening in the tank. Pistol grip handle. Air release. Safety valve.

For light brazing, annealing light material, brazing wire, on rubber work, to heat soldering coppers. Soldering iron hook is removable.

Capacity, 1 quart. Weight, 4¼ pounds.

No. 149T

No. 149T TORCH

Has the well known Double Jet No. 92 burner with a windshield as shown. Can be used for any outdoor work in the strongest wind. The burner is very powerful. The flame produced is one inch in diameter at the burner. Soldering iron hook is removable.

Capacity, 1 quart. Weight, 5½ pounds.

No. 192T

No. 192T TORCH

The standard No. 92 with famous Double Jet burner. Pump in handle. Removable soldering iron hook. Rigid burner. Suited to all kinds of work where concentration of great heat is wanted.

Capacity, 1 quart. Weight, 4½ pounds.

No. 193T TORCH

Same as No. 192T except burner mounted on swivel to allow for use in irregular places.

Capacity, 1 quart. Weight, 4½ pounds.

Lists showing repair parts for any torch furnished on request

Digitized by Google

C. & L. Double Needle Blow Torches

FOR GASOLINE OR KEROSENE

No. 206C

No. 206C TORCH

This two-quart Torch is extra large and powerful. Double Needle Burner produces tremendous heat. Burns gasoline or kerosene by changing the jet block in the burner. The upper needle cleans the gas orifice. Lower needle regulates the flame. Both needles are blunt. Cast bronze hook is removable. Tank is made of heavy gauge seamless drawn brass and fitted with powerful automatic pump.

Capacity, 2 quarts. Weight, 7¾ lbs.

No. 208C

No. 208C TORCH

Most powerful quart torch ever produced. Works in wind and zero weather. Improved Double Needle Burner, with super-heating chamber, made of bronze metal. Burns either gasoline or kerosene by changing jet block in the burner. Both needles are blunt, which makes it impossible to enlarge the orifice. The upper needle has a wire tip which cleans the orifice. The lower needle is the shut-off which regulates and controls the flame. Tank made of heavy gauge seamless drawn brass and fitted with automatic brass pump. Cast bronze hook is removable.

Capacity, 1 quart. Weight, 5⅛ lbs.

No. 210C is exactly the same in construction as No. 208C, only it is one size smaller.

Capacity, 1 pint. Weight, 4 lbs.

No. 48C

No. 48C TORCH

The No. 48C is oblong, only 1⅞ inches thick, and especially adapted to requirements of automobile users, electricians and repair men, as it can be easily carried in any tool kit. Hinged supports at base prevent tipping over. Improved Double Needle Burner produces an intensely hot blue flame. It is fitted with cast bronze hook and support for holding a soldering copper. Hook is removable.

Capacity, 1 pint. Weight, 4¼ lbs.

Lists showing repair parts for any torch furnished on request

Digitized by Google

Turner New Line Torches

FOR GASOLINE OR KEROSENE

Polished Brass Tanks

No. 122T

No. 122T TORCH

Has improved burner inlet in the tank so constructed that heat from burner cannot penetrate to the tank. Improved burner with very prominent baffle. Shut-off and adjusting needle are separate making it impossible to enlarge the orifice. Pump in handle. Soldering iron hook is removable.

Capacity, 1 quart. Weight, 4 lbs.

No. 130T—same as No. 122T except pump in tank.

Capacity, 1 quart. Weight, 4½ lbs.

No. 138T

No. 138T TORCH

An exceptionally good medium priced torch. Seamless brass tank, shut-off and adjusting needle separate. Baffle in burner and flared tube syphons correct entrainment of air.

Pump in handle. Soldering iron hook is removable.

Capacity, 1 quart. Weight, 4 lbs.

No. 139T—same as No. 138T except pump in tank.

Capacity, 1 quart. Weight, 4½ lbs.

Single Needle Torches

No. 1205T

No. 1205T TORCH

A low priced well constructed and generally satisfactory single needle torch.

Seamless brass tank, funnel shaped bottom. Improved pump in the handle.

Soldering iron hook is removable.

Capacity, 1 quart. Weight, 4 lbs.

No. 1105T—same as No. 1205T except 1 size smaller.

Capacity, 1 pint. Weight, 3½ lbs.

Lists showing repair parts for any torch furnished on request

Digitized by Google

C. & L. Single Needle Torches

FOR GASOLINE

No. 32C

No. 32C TORCH FOR GASOLINE

Fitted with back-flow burner, made of bronze metal which super-heats the gas and produces a perfect blue flame of intense heat in wind or extreme cold. Burner has cast bronze hook and support for holding copper. Hook is removable. Tank made of heavy gauge seamless drawn brass, reinforced and has concaved brass bottom. Fitted with automatic brass pump.

Capacity, 1 quart. Weight, 4½ lbs.

No. 38C is exactly the same in construction as No. 32C, only it is one size smaller.

Capacity, 1 pint. Weight, 3 lbs.

No. 130C

No. 130C TORCH

A medium priced torch of good value. Burner with under generator vein and tapered burner tube is made of bronze metal. Produces a strong steady blue flame. Cast bronze hook is removable. Tank made of heavy gauge seamless drawn brass and has concaved brass bottom. Fitted with automatic brass pump.

Capacity, 1 quart. Weight, 4¼ lbs.

No. 148C—same as No. 130C except pump forms the handle.

Capacity, 1 quart. Weight, 4 lbs.

No. 144C

No. 144C TORCH

Is made to meet the demand for a low priced torch. Burner is made of bronze metal and generates a hot blue flame. Cast bronze hook is removable. Tank is made of seamless drawn brass with funnel shaped bottom. Fitted with automatic brass pump.

Capacity, 1 quart. Weight, 4 lbs.

No. 146C is exactly the same in construction as No. 144C only it is one size smaller.

Capacity, 1 pint. Weight, 3 lbs.

Lists showing repair parts for any torch furnished on request

Digitized by Google

Turner Master Line Torches

FOR GASOLINE OR KEROSENE

Polished Brass Tanks

Pistol Grip Handles

No. 143T

No. 143T TORCH

Shut-off and needle valve separate making it impossible to enlarge the orifice. Flared tube in front of fuel jet automatically syphons the correct amount of air. Safety valve prevents pumping too great an amount of air into the tank. Air release valve enables operator to reduce pressure in tank or to relieve the pressure entirely when through using the torch. Soldering iron hook removable.

Capacity, 1 quart. Weight, 4 lbs.

No. 145T

No. 145T TORCH

Shut-off and needle valve separate. Large burner. Will operate perfectly in wind or coldest weather. Adjustable air intake can be regulated to meet requirements for various grades of fuel. The "swell" in the burner provides for deflection of the flame onto the baffle insuring gasification of either gasoline or kerosene.

Capacity, 1 quart. Weight, 4½ lbs.

No. 147T

No. 147T TORCH

The powerful burner of the No. 147T torch generates a flame adapted to all requirements. The shut-off valve and adjusting needle are separate insuring long life and freedom from repairs. Only one opening in seamless brass tank prevents leaks from soldered connections. The safety valve and air release is a surety from explosions and fire hazard. The pistol grip handle is comfortable and convenient. The No. 147T torch is the ideal torch for varied classes of work. Soldering iron hook is removable.

Capacity, 1 quart. Weight, 4½ lbs.

No. 152T is a flat torch of one pint capacity with same burner and other features of the No. 145T.

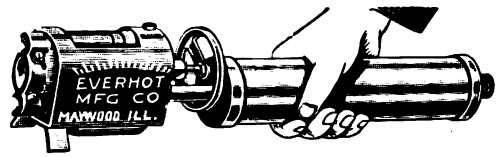
Capacity, 1 pint. Weight, 3 lbs.

Lists showing repair parts for any torch furnished on request

Digitized by Google

Everhot Blow Torch—Self Heating

SOLDERING IRON AND BRANDING IRON



Torches with Shields Over Burners

No. 20. Length, 16 in.; capacity, ¾ pint $11.00
No. 30. Length, 18½ in.; capacity, 1 pint 12.75

The Everhot torch maintains any desired temperature indoors or out even in the coldest wind, due to the shield over the burner.

A patented preheating chamber acts as a carburetor, changing the fuel into a perfectly dry gas that results in a much hotter flame of pure blue, while using considerably less fuel.

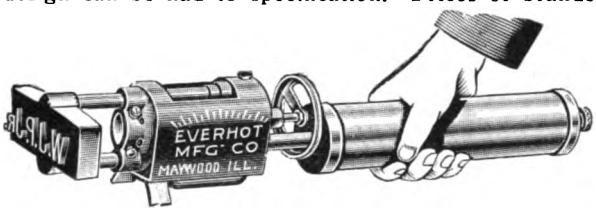
Its regulation is perfect. Can be stopped down to a very low, steady, blue flame.

The needle valve controlling the flame is self-cleaning in the fullest sense, and on account of its construction cannot be injured by screwing in too tightly.

All types have pump and filling cap in handle. Handle made of seamless brass tubing, with ends of solid brass.

Does away with necessity of bulky fire pots or stoves for heating irons.

Soldering tips, dipping cups, pouring ladle, or branding irons can be attached to perform various tasks. The branding iron for branding tools, timbers, ties, etc., has been quite generally adopted by railroad manufacturers and contractors as the best theft preventative. The various attachments are shown below and brands of any design can be had to specification. Prices of brands furnished on application.



Torch **Showing Brand Attached**

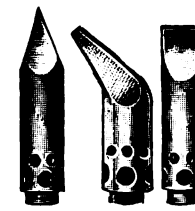
No. 50

The No. 50 Everhot torch has a seamless copper tank and the same efficient burner used on the No. 20 and No. 30 torches.

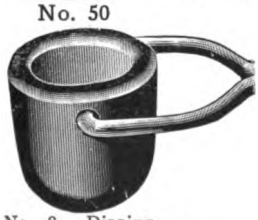
Will operate in any kind of weather, is equipped with windshield over burner.
No. 50. Capacity, 1 qt.....$10.00

SOLDERING TIPS

No. 1A $1.50
No. 1AA 1.50
No. 1B 1.50
Weight, 9 oz. each.

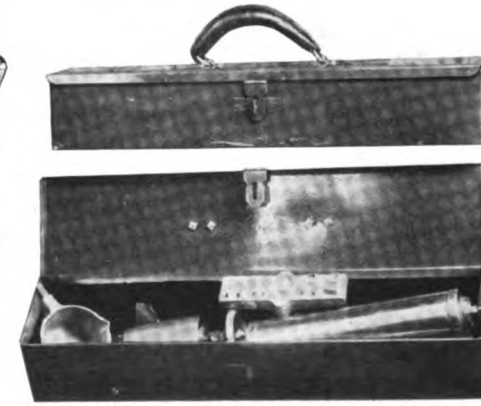


1A 1AA 1B



No. 8. Dipping Cup $1.00

No. 9. Pouring Ladle, capacity 2 lbs.....$1.00
No. 10. Capacity, 5 lbs..... 1.00



Indestructible Steel Tool Kit

Just the thing for carrying Everhot equipment and as a maintainer's tool box, $4.00 each.

Digitized by Google

No. 340

Turner Coil Furnaces or Fire Pots

No. 340 FURNACE FOR GASOLINE

Heavy gauge steel tank reinforced at every joint. Turner bronze burner attached to swivel joint. Turner automatic pump in tank. Will heat pair of heaviest soldering coppers and melt a pot of metal at the same time with minimum fuel consumption. A furnace for general use recommended for tinners, iron and copper workers, plumbers and electricians.

Capacity, 7 pints. Weight, 17 lbs.

No. 630

No. 630 HOT BLAST COIL FURNACE

For Gasoline

Tank of extra heavy seamless drawn steel, copper plated inside and out. Equipped with Turner bronze spider casting for supporting the uprights. One of most durable furnaces made. Combined Turner automatic pump and filler plug in tank. Safety valve prevents explosions and reduces fire hazard.

Capacity, 7 pints. Weight, 16 lbs.

No. 530. Same as No. 630 except air pressure is produced in tank by means of rubber bulb.

No. 660

No. 660 KEROSENE FIRE POT

Air release and safety valve make this an especially safe kerosene furnace. Extra heavy copper plated rust proof and leak proof tank of seamless drawn steel. Furnace has no coils to burn or clog. Patented burner super-heats kerosene before it is burned, producing perfect combustion and greatest heat possible. Will give perfect service in wind, rain or coldest weather. Pump in tank.

Capacity, 7 pints. Weight, 16 lbs.

No. 760

No. 760 GASOLINE COIL FURNACE

Seamless drawn steel tank, copper plated, with bottom welded in. Large pump and filler plug combined with dust proof cap. Malleable top plate and drawn drip cup. An excellent medium priced coil furnace for general use.

Capacity, 7 pints. Weight, 14 lbs.

No. 760B. Same as No. 760 except air pressure is produced with rubber bulb.

Capacity, 7 pints. Weight, 13½ lbs.

Lists showing repair parts for any furnace furnished on request

Digitized by Google

C. & L. Coil Furnaces or Fire Pots

FOR GASOLINE

No. 22 COIL FIRE POT FOR GASOLINE

The No. 22 Fire Pot is the latest improved, up-to-date Coil Fire Pot, made with seamless drawn steel tank, tinned inside and out (rust proof), large funnel and dust-proof filler plug, heavy uprights, large valve, cushion protection band at base of tank and heavy malleable top plate. Patented three piece coil cup and top plate enables the user to remove the top section by unscrewing three large nuts exposing the burner and coil. There are no coil cup lugs or small nuts to burn off. Air pressure is produced by means of an automatic brass pump.

Capacity, 1 gallon. Weight, 12½ lbs.

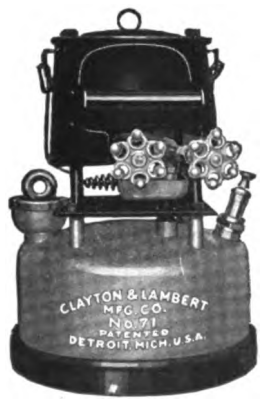
The No. 12 Steel Fire Pot is exactly the same as No. 22, except the air pressure is produced in the tank by means of a rubber bulb.

Capacity, 1 gallon. Weight, 12½ lbs.

No. 1 FIRE POT FOR GASOLINE

The No. 1 Improved Fire Pot is adapted to a greater variety of uses than any other fire pot made. Tank is of heavy gauge seamless drawn steel reinforced, tinned inside and out (rust proof) and fitted with patented cushion protection band preventing injury to the base of the tank and supplied with large funnel and filler plug having dust-proof cap. Swivel burner permits moving the flame up or down. Will easily heat a pair of 12-lb. coppers and melt a pot of lead at the same time. Top section is removable, making an open fire.

Capacity, 1 gallon. Weight, 14 lbs.



No. 71 FIRE POT FOR GASOLINE

The No. 71 Improved Fire Pot is noiseless, smokeless, and odorless. Has sub-flame for the generator which permits the heating flame to be turned low when not in use. Burner has double heating surfaces producing intensely hot blue flames, which burn from each side to the center. Will heat a pair of 12-lb. coppers quickly while melting a pot of metal. Tank is made of drawn steel, tinned inside and out to prevent rust. No. 71 is the hottest fire pot made. It is wind proof and not affected by extreme cold.

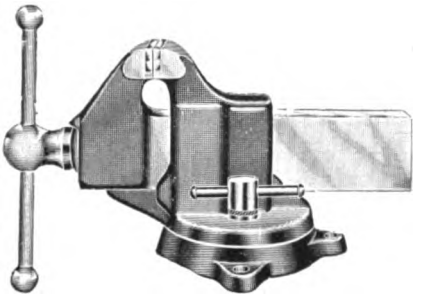
Capacity, 1 gallon. Weight, 16¼ lbs.

Lists showing repair parts for any fire pot furnished on request

Digitized by Google

Machinists' Bench Vises

DIAMOND SWIVEL VISE

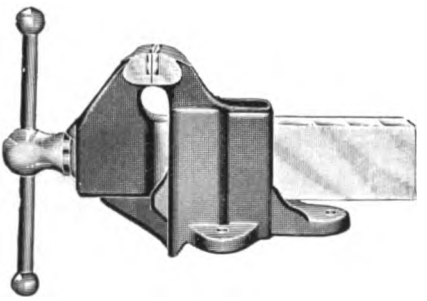


No. 70

	Width, Jaw, Inches	Opens, Inches	Weight
No. 70	2½	2½	20 lbs.
No. 71	3	4	28 lbs.
No. 72	3½	5	38 lbs.
No. 73	4	6	54 lbs.
No. 74	4½	6½	65 lbs.
No. 75	5	7½	90 lbs.
No. 76	5½	8½	120 lbs.
No. 77	6	10	130 lbs.
No. 78	7	12	240 lbs.

This vise can be turned in any position on an axis parallel with the floor and is locked by a clamping bolt, which works in a channel.

DIAMOND STATIONARY VISE

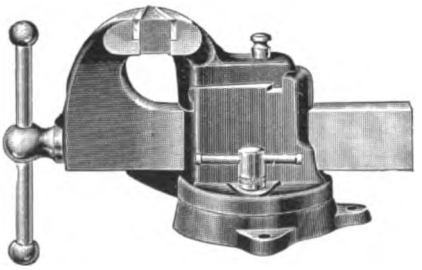


No. 90

	Width, Jaw, Inches	Opens, Inches	Weight
No. 90	2½	2½	17 lbs.
No. 91	3	4	22 lbs.
No. 92	3½	5	28 lbs.
No. 93	4	6	42 lbs.
No. 94	4½	6½	54 lbs.
No. 95	5	7½	75 lbs.
No. 96	5½	8½	101 lbs.
No. 97	6	10	135 lbs.
No. 98	7	12	210 lbs.

A standard stationary base vise of guaranteed quality.

DIAMOND SWIVEL VISE WITH SELF ADJUSTING JAW



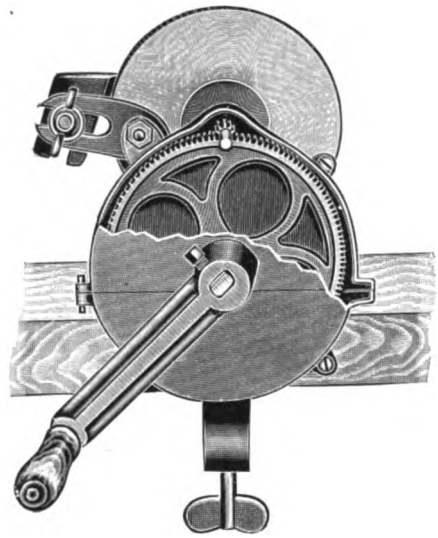
No. 50

	Width, Jaw, Inches	Opens, Inches	Weight
No. 50	3½	5	37 lbs.
No. 51	4	6½	53 lbs.
No. 52	4½	7	70 lbs.
No. 53	5	7½	95 lbs.
No. 54	5½	8½	125 lbs.
No. 55	6	11	158 lbs.
No. 56	7	12	220 lbs.

A standard swivel vise, with self-adjusting jaw. Can be turned in any position parallel with the floor, and is locked by a clamping bolt. Vise is lower in design than other swivel base types, having self-adjusting jaws. The back jaw is self-adjusting, conforms automatically to any angle and makes firm the object held.

Digitized by Google

Railway Grinders



No. C.H. 175B

(Attachments not shown)

A portable railway grinder that is large and heavy enough to do any work within the range of a hand-power machine. Weight, 26 pounds. It is far lighter than a grindstone and can easily be made a part of the regular road equipment of any section or construction gang. Will cut twenty times as fast as the grindstone. There is no water needed and no danger of drawing the temper. The grinding wheel (7-inch diameter, 1¼-inch face) is an aluminum oxide which, with its temper and toughness, makes it the most satisfactory abrasive for general use. Furnished with attachments for grinding flat and twist drills, adzes and scythes.

No. C.H. 175B. Railway Grinder, complete with attachments.

SPECIAL TOOL HOUSE GRINDER

Style M

The special grinders, made in three sizes, are high class machines and intended for long wear and hard usage. The spiral pinion gear is cut from solid steel. The casing is in one piece and oil tight. The No. C.H. 7 is intended for use by contractors and general mechanics and has adjustable handle. Can furnish attachment for grinding regular twist drills up to 1¼ inches. These attachments are very practical and will grind the correct bevel on drills.

Number	C.H. 7	C.H. 6	C.H. 5
Size of wheel, inches	7x1¼	6x1	5x1
Weight, pounds	24	13	9

Digitized by Google

Memoranda

Digitized by Google

INDEX

A

Description — Page No.

Acid Gloves 291
Adjustable Hack Saw Frames..... 309
Adjustable Slip Joint Pliers..... 279
Adjustable Testing Resistance ..248-251
Adjustable Track Resistances....171-174
Adjustable Wrenches 300, 301
Adjusters—Lamp 44, 45
Advance Warning Signs..... 138
Aerial Cable Rings.....329, 330
Allen's Soldering Specialties..... 325
Alternating Current Meters.....
.....257-260, 264, 266, 269, 271
Alternating Current Relays—
Power-off 234
Aluminum Tags 175
Amalgamated Battery Zincs.....211-213
American Standard Wire Gauge.... 291
Ammeters 252-272
Anchor Bolts 142, 144, 145
Annunciators 122-125
Approach Warning Signs..... 138
Approach Lighting Line Relay..... 102
A. R. A. Battery 210
A. R. A. Lamp Body 48-50
A. R. A. Stuffing Boxes 200
A. R. A. Terminals 178
A. R. A. Testing Resistance 251
"Armco" Iron Wire..... 187
Armorlokt Parkway Cable..... 182
Arms—Cross 338
Arresters—Lightning 162-167
A. T. & T. Marline Cable Hangers. 328
Atkins Saws 308
Auger Bits and Braces.....284-286
Augers—Post Hole 313
Angle Wrenches 296-299
"Autoflags" 4-19
Model 1 (Repair Parts Only)..... 28
Model 1-A (Repair Parts Only).. 27
Model 1-B (Repair Parts Only).. 26
Model 2 (Repair Parts Only)...24, 25
Model 5 (Magnetic) 4-15
Style "T"..... 18
"Autoflag" Foundation Bases....144-146
"Autoflag" Test Box 126
Automatic Strand Puller 281
Automatic Drills and Screw Drivers 288
Axes and Hatchets..... 305

B

Back Strap Scoops..... 311
Bags—Tool and Inspector's..... 320
Ball Pein Hammers..... 306
Banners—"Autoflag" 13, 24-28
Banner—Stop 139
Barrel Shaped Jars..... 215
Bars—Cable Reel 319
Bars—Digging and Tamping....316, 317

Description — Page No.

Base-of-Mast Relay Case..... 142
Bases—Foundation 144-146
Batteries 210-222
A. R. A. Plate Type..... 210
Gravity 211
Storage 218-222
Unit Cylinder Type..... 210
Battery Boxes—Concrete 154, 155
Battery Boxes—Iron, Wood 153
Battery Brushes 217
Battery Cases 142
Battery Chargers—Non-Tune Rectifiers 223-232
Battery Chutes—Cast Iron 151, 152
Battery Clips 247
Battery Connectors 180
Battery Coppers 214
Battery Elevators 151, 152
Battery Hydrometers 216
Battery Jars—Glass 215
Battery Knives 217
Battery Resistances 170-174
Battery Supplies 215-217
Battery Switches 128, 129
Battery Tubs—Concrete 155-157
Battery Vaults—Concrete 156, 157
Battery Zincs—All Kinds 211-213
Bellows—Hand, Cylinder 291
Bells—Electric, Vibrating 56-85
Skeleton 78, 82
Iron Box 78, 82
Lungen 78
Transformer 77, 80, 83
Weatherproof.....76, 77, 79, 80, 83-85
Bells—Highway Crossing 56-71
No. 222, Gong Type.....56, 57
No. 333 (Repair Parts Only)..... 73
No. 444, Motor Driven Locomotive Type 70-72
No. 555, Motor Driven Gong Type 62, 63, 73
No. 666 (Repair Parts Only)..... 74
No. 990, Locomotive Type.....66, 67
No. 1220 Gong Type.....60, 61
Style "A" and "AA" (Repair Parts Only) 75
Style A. L. 50, Locomotive Type 68, 69
Style "D" 58, 59
Style "E" 64, 65
Belt Pouches 323
Belts—Lineman's Tool 323
Bench Grinder and Buffer—Electric 345
Bench Vises 354
Bernard Pliers 278
Billings Wrenches 296-299
Binding Posts 180
Bit Braces 284, 286
Bits—Auger 284, 285

Digitized by Google

Description	Page No.
Black Fibre Tags	175
Blake Insulated Staples	326
Blocks—A. R. A. Terminal	178
Blocks—Lineman's Self Locking	283
Blocks—Pulley, Wood, Malleable, Steel	280
"Blow-Rite" Fuse Wire	133
Blow Torches	346-351
Blue Vitriol	215
Body, Semaphore Lamp	46-49
Bolt Cutter	290
Bolts—Anchor or Foundation	142, 144, 145
Bolts—Carriage	339
Bolts—Double Arming	339
Bolts—Eye	340
Bolts—Machine and Through	339
Bonding Drills	192
Bonding Machines	192
Bond Wires	186, 187
Bootleg Terminal	148
Boxes—"Autoflag" Test	126
Boxes, Battery—Concrete	154
Boxes, Battery—Iron, Wood	153
Boxes—Parkway Cable Junction	148
Boxes—Relay—Iron, Wood	140-143
Boxes—Stuffing	200
Boxes—Sub-base Junction	146, 147
Boxes—Tool	321, 351
Boxwood Rules	292
Braces—Auger Bit	284, 286
Braces—Cross Arm	339
Brackets—Gooseneck	140, 141
Brackets—House	335
Brackets—Wood	338
Brackets—Universal or "L"	341
Brands	351
Brass Battery Connectors	180
Brass Tags	175
Brass Terminals	179
Brass Wire Eyelets	177
Breast Drills	287
Broad Axe	305
Bronze Bushings	199
Bronze Padlocks	159
Brushes—Battery	217
"Buffalo" Grips	282
Buffing and Grinding Motors	345
Burner Pliers	277, 279
Burring Reamers	302
Bushings—Crank and Pin, Bronze	199
Bushings—Reducer	149
Bus Bar Connection Strip	179
Button Pliers	279
Buttons—Push	77, 127
Buzzers—Electric	78-84
Car	81
Heavy Duty	81
Iron Box	78-81
Lungen	78
Transformer	80
Weatherproof	84

C

Description	Page No.
Cable—Chute	183
Cable Grips	318
Cable and Wire Terminals	176, 177
Cable Hangers	328-331
Cable Hooks	328
Cable Knives—Splitting, Stripping	318
Cable Outlet	149
Cable—Parkway	182
Cable Post Bases	145
Cable Post Pinnacles	149
Cable Posts	150
Cable Reel Bars	319
Cable Reel Jacks	319
Cable Ring Crimper	331
Cable Rings	329-331
Cable Rollers	318
Cable Sheath Splitting Knife	318
Cable Stripper Knife	318
Caliper—Micrometer	291
Cant Hook	314
Canvas Tool Bags	320
Capping and Trunking	198
Car Bits	285
Car Buzzers	81
Car Wrenches	299
Carpenter's Square	291
Carriage Bolts	339
Carrying Hooks—Timber	314
Cartridge Type Resistances	170
Cast Brass Terminals	179
Cast Brass Thumb Screws	217
Cast Iron Battery Boxes	153
Cast Iron Battery Chutes	151, 152
Cast Iron Signs	136, 137
Cast Iron Foundation Bases	144, 145
Cast Iron Relay Boxes	140-142
Chain Drills	286
Chain Nose Pliers	277
Chain Vise—Pipe	302
Champion Screw Drivers	289
Chance Special Lineman's Wrench	300
Channel Pin Punches and Sets	189
Channel Pins	188
Carborundum Lightning Arresters	117
Charcoal Filled Grounds	168, 169
Check Nut Wrenches	297
"Chicago" Derailer	206
"Chicago" Grips—Wire and Cable	281
Chisels—Cold, Wood, Framing	290
Chopping Axe	305
Chutes, Battery—Cast Iron	151, 152
Circular Battery Zincs	212
Clamps—Haven's Steel	283
Clamps—Iron	149
Clamps—Splicing	274
Clamps—Steel Guy	341
Claw Hammers	306
Claw Hatchets	305

Digitized by Google

Description	Page No.
Climbers—Pole	321
Clips—Crosby	341
Clips—Fuse	133
Clips—Universal Test	246, 247
Cloth Tape	326
Coil Furnaces	352
Cold Chisels	290
Combination Pliers	278
Combination Wire and Sleeve Clamps	274
Combined Flashing and Interlocking Relay	115
Combination Flasher and Time Relay	118
Combination Power-off and Series Line Relay	103
Combined Rectifier and Lighting Unit	229-231
Combined Transformer and Power-off Relay	235-237
Compass Saw	307, 308
Composition Base Switches	129
Compound—"P. & B." Electrical	327
Compound—Soldering	325
Compression Bottom Tie Plates	202
Concrete Battery Boxes	154
Concrete Battery Vaults	155-157
Concrete Pipe Carrier Foundations	158
Condensers	132
Cones—"Paragon" Ground	169
Connectors—Battery	180
Connectors—Wire and Sleeve	274
Contacts—Rail	110-114
Continuous Insulated Rail Joints	204
Copper Bond Wires	186
Copper Clad Bond Wires	186
Copper Cones—"Paragon" Ground	169
Copper Connecting Links for A. R. A. Terminals	178
Copper Ground Cones and Cylinders	168, 169
Coppers—Battery, All Kinds	214
Copper Sleeves	332, 333
Coppers—Soldering	324
Copper Sulphate	215
Copper Terminals	176, 177
Copper Wire Eyelets	177
Cotter Pin Pullers	304
Counters—Signal	134
Counters—Pole, Speed, Hand Tally	294
Covers—Battery, Porcelain	210
Crank Pin Bushings—Bronze	199
Crescent Pattern Wrenches	300
Crimping Pliers for Cable Rings	331
Crosby Clips	341
Cross Arm Braces	339
Cross Arms	338
Cross Cut Saws	307, 308
Crossing Approach Warning Signs	138
Crossing Bells—See Bells, Highway Crossing	56-71
Crossing Gates—Electric	51-54
Crossing Signals—"Autoflag"	4-19
Crossing Signals—Highway	29
Crossing Signals—Light	30-41
Crossing Signs—Advance Warning	138
Crossing Signs—Illuminated	42, 43
Crossing Signs—Non-Illuminated	136, 137
Crossing Watchman's Stop Banner	139
Crow Bars	317
Crowfoot Zincs	211
Curved Nose Pliers	275-277
Cutaway Bottom Tie Plates	202
Cutter—Bolt	290
Cutter—Pipe	303
Cylinder Bellows	291
Cylinders—"Paragon" Ground	169
Cylinder Zincs	213

D

Description	Page No.
Dandy Soldering Paste	325
Danger Signs—Cast Iron	137
Danger Signs—Illuminated	42, 43
Daniel Zinc	213
Davidson Cable Hanger	331
Derailer—"Chicago"	206
Derrick Augers	285
"D" Handle Shovels	310
Diagonal Cutting Pliers	276-278
Dies—Pipe Threading	303
Die Stock Sleeve Twister	274
Diggers—Post Hole	313
Digging Bars	316, 317
Digging Spades	310
Digging Spoons	311
Digging Tools—"Loy," "Spud"	317
Direct Current Meters	252-258, 260-263, 265, 267, 271
Direct Drive Counters	134
Disappearing Banner Type "Autoflags"	4, 5, 10, 11, 24, 25
Double Arming Bolts	339
Double Braid Weatherproof Wire	184
Double Contact Power-off Relay	234
Double-Door Relay and Battery Cases	142
Double-Duty Rectifier	224, 225
Double End Connectors	179, 180
Double End Wrenches	299, 300
Double Galvanized Iron Wire	185-187
Double Groove Channel Pins	188
Double Jet Blow Torches	346, 347
Double Track Approach Warning Signs	138
Double Tube Wire Sleeves	332, 333
Double-Wave Rectifiers	224-232
Draw Shave	290
Drift Punches	189, 304
Drilling Machines—Bonding	192-195
Drilling Machines—Track	196, 197
Drills—Bonding	192
Drills—Chain	286
Drills—Hand or Breast	287

Digitized by Google

Description	Page No.
Drills—Portable Electric	342, 343
Drill Stands	342, 343
Drills—Star	290
Drills—"Yankee"	288
Drivers—Screw	288, 289
Drop Forged Wrenches	296-299
Duck Bill Pliers	275, 277
Duplex Light Signal	50
Duplex Signal Bonds	191
Duplex Wire Sleeves	332, 333
Dynamometer Portable Instrument	260
E	
Eastern Climbers	321
Electrical Compound—"P. & B."	327
Electrical Testing Instruments	245-272
Electric Bells	56-85
Skeleton	78, 82
Iron Box	78, 82
Lungen	78
Transformer	77, 80, 83
Weatherproof	76, 77, 79, 80, 83, 85
Electric Buzzers	78-84
Car	81
Heavy Duty	81
Iron Box	78, 81
Lungen	78
Transformer	80
Weatherproof	84
Electric Drills, Hammers, Saws	252-254
Electrician's Knife	289
Electrician's Pliers	275-278
Electrician's Rubber Gloves	291
Electrician's Screw Drivers	289
Electrician's Tool Bags	320
Electric Semaphore Lights	46-49
Elements—Battery	210-214
Elements—Time	106-109
Elevators—Battery	151, 152
Emergency Release Switch	131
Enameled Resistor Units	171
End Cutting Pliers	278
End Plate—Motor	23
End Posts—Fibre	203-205
Engineer's Hammers	306
Engineer's Wrenches	296-300
Everett Annunciator	124, 125
"Everhot" Soldering Iron and Blow Torch	351
"Exide" Storage Battery	218-222
Expansive Bit	285
Eye Blocks	280
Eye Bolts	340
Eyelets—Wire	177
F	
"Favorite" Tree Trimmers	305
Fence Tools	279
Fibre Parts for Rail Joints	203-205
Fibre Tags	175
Figures and Letters—Steel	295
Fire Pots	352, 353
Fixed Condensers	132
Fixed Track Resistance	170, 172
Fixture Pliers	279
Flameweld Bonds	190
Flashing Light Crossing Signals	30-41
Flashing Relays	115-121
Flat Nose Pliers	275-277
Flint Glass Battery Jars	215
Fluxing Solder	329
Flux—Soldering	329
Focusing Devices	44, 45
Foundation Bases	144, 145
Foundation Bolts	144, 145
Foundations—Pipe Carrier, Concrete	158
Forged Wrenches	296-299
Ford Pattern Auger Bits	285
Frames—Hack Saw	309
Framing Chisels	290
Friction Tape	326
Fuller Zinc	213
Full-Wave Rectifiers	224-232
Furnaces—Gasoline	352, 353
Fuse Clips	133
Fuse Wire	133
G	
Gains—Steel	337
Galvanized Ground Rods	168
Galvanized Iron Bond Wires	186, 187
Galvanized Iron Line Wire	185
Galvanized Steel Strand	334
Gaps—Spark	166-167
Gas Pliers	279
Gates—Electric Crossing	51-54
Gauge—Wire, American Standard	291
"Gem" Cable and Wire Grips	319
Glass Battery Jars	215
Glass Insulators	337
Gloves—Rubber	291
Gong Type Crossing Bells	40-75
Gong Type Vibrating Bells	76-85
Gooseneck Brackets	140, 141
Gravity Battery	211
Gravity Battery Coppers	214
Gravity Battery Hydrometers	216
Gravity Battery Jars	215
Gravity Battery Supplies	215-217
Gravity Battery Zincs—All Kinds	211-213
Grey Fibre Tags	175
Grinder—Railway Tool	355
Grinder—Tool Post	343
Grinding and Buffing Motors	345
Grips—Cable	319
Grips—Wire	281-283
Ground Cones—"Paragon"	169
Ground Cylinders—"Paragon"	169
Ground Plates	168
Ground Rods—Galvanized	168
Guarded Pike Poles	316
Guy Clamps	341
Guy Hooks	341
Guy Wire—Strand	334

Digitized by Google

H

Description Page No.

Hack Saws 309
Half and Half Solder..... 325
Half-Wave Rectifiers 224-232
Hammers—Hand 306
Hammers—Portable Electric 344
Hand Axes 305
Hand Bellows 291
Hand Drills 287
Handles—Shovel 312
Hand Saws 307, 308
Hand Stop Banners 139
Hand Tally Counters 294
Hand Trip Bells 86
Hangers—Cable 328-331
Hangers—Messenger 341
Hard Rubber Syringe..... 217
Hatchets 305
Haven's Steel Clamps..... 283
Heat Resisting Glass Jars.....210, 215
High Voltage Lightning Arresters.. 165
High Voltage Push Buttons..... 127
High Voltage Rail Contacts..... 114
High Voltage Rectifiers 232
High Voltage Relays 100, 101, 104
Highway Crossing Approach Warning Signs 138
Highway Crossing Bells—See Bells, Highway Crossing 40-75
Highway Crossing Gates, Electric.51-54
Highway Crossing Signals.....4-41
Highway Crossing Signs—Cast Iron 136, 137
Highway Crossing Signs—Illuminated 42, 43
Hinged Pipe Vise..... 302
Holders—Number Plate 160
Hollow Back Scoops..... 311
Hooks—Cable 328
Hooks—Guy 341
Hook Head Pole Step..... 340
Hooks—Shave 318
Horizontal Stop Units.....35, 36
House Brackets 335
Hydrometers—Storage, Gravity..... 216
"Hyduty" Paulus Track Drill...196, 197

I

Illuminated Crossing Signs.....42, 43
Illuminated Danger Signs.....42, 43
Illuminated Stop Sign 35, 36, 42
Inlets—Oil 200
Inspection Platforms, Portable..... 22
Inspection Volt-Ammeters 245-272
Inspector's Tool Bags..... 320
Instruments—Electrical Testing..245-272
Insulated Battery Connectors..... 180
Insulated Rail Joints.....203-205
Insulated Staples 326
Insulated Wire 183
Insulating Compound—"P. & B."... 327

Description Page No.

Insulations—Pipe Line, Switch Rod 201
Insulators—Line 335-337
Insulators for Universal Test Clips 246, 247
Interlocking Relays.....88-94
Iron Bases 144-146
Iron Battery Boxes 153
Iron Battery Chutes 151, 152
Iron Bond Wires 186, 187
Iron Box Bells and Buzzers.....76-85
Iron Cable Posts 150
Iron Levels 292
Iron Line Wire 185, 187
Iron Relay Boxes 140-142
Iron Shell Pulley Blocks..... 280
Iron Signs 136, 137
Iron Sleeves—Tinned 333
Iron Wire—Bonding and Line...185-187
Irwin Pattern Auger Bits..... 284

J

Jacks—Cable Reel 319
Jacks—Testing 129
Jack Straps 322
Jars—Glass Battery 210, 215
Jeweler's Soldering Coppers..... 324
Jewell Instruments 256-260, 262
Joints—Insulated Rail.....203-205
Junction Boxes—Sub-base.....146, 147

K

Key Hole Saws.....307, 308
Keys—Strap, Testing 129, 130
Klein's Pliers 275
Knife Handle Wrenches..... 300
Knife Switches 128, 129
Knives—Battery Scraper 217
Knives—Cable Sheath Splitting..... 318
Knives—Cable Stripper 318
Knives—Electrician's Pocket 289
Knobs—Insulating 335

L

Ladles—Pouring 324
Lag Screws 339
Lag Screw Wrenches 300
Lamp Adjuster 44, 45
Lamp Body—Semaphore 46-49
Lamp Focusing Devices 44, 45
Leather Tool Bags..... 320
Leich Rectifiers—Non-Tune.....223-232
Letters and Figures—Steel..... 295
Levels 292
Light Crossing Signals 30-41
Light Flashing Relay 115-121
Lights—Pilot or Marker.....20, 21
Light Signal Counter..... 134
Lighting Transformers 233
Lighting Units—Transformer and Relay Combined 235-237
Lightning Arresters 162-167
Lineman's Broad Axe..... 305
Lineman's Eye Blocks..... 280

Digitized by Google

Description	Page No.
Lineman's Pliers	275-277
Lineman's Rubber Gloves	291
Lineman's Tool Bags	320
Lineman's Tool Belts	323
Lineman's Tool	282
Lineman's Wrenches	300
Linen Tape Lines	292
Line Relay—Approach Lighting	102
Line Relays—Neutral	95-99
Line Wire	184, 185
Link—Connecting, for A. R. A. Terminals	178
Locks—Perfection and Signal	159
Locks—Pin	199
Locomotive Type Crossing Bell	66-73
Long Handled Shovels	311, 312
Long Handled Stop Banners	139
Long Nose Pliers	275-277
Loy Digging Tool	317
Luminous Push Button	77
Lunger Bells and Buzzers	78

M

Machine Bolts	340
Machinist's Hammers	306
Machinist's Vises	354
Machinist's Wrenches	296-300
Magnetic Flasher Unit	120
Magnetic Type "Autoflag"	4-19
Mansbridge Condensers	132
Marking Tags	175
Marline Cable Hangers	328
Marker Lights	20, 21
"Matlock" Cable Roller	318
McIntyre Sleeves	332, 333
Measuring Instruments—Electrical	245-272
Mechanical Rectifiers—Non-Tune	223-232
Melting Pots	324
Messenger Clamps	149
Messenger Hangers and Supports	341
Messenger Strand	334
M.F. Flasher Unit	116-119
Micrometer Caliper	291
Monkey Wrenches	300
Motor Driven "Autoflags"—"Wig-Wags"	17, 18
Motor Driven Crossing Bells	62-65, 68-72
Motors—Grinding and Buffing	345
Motor End Plate	23
Multiple Track Signs	137, 138

N

Nail Blade Saws	307-309
Nail Hammers	306
National Cable Rings	329
Needle Nose Pliers	275-277
Nests of Saws	307, 308
Neutral Relays	95-99
"N-N" Electric Crossing Gates	51-54
New Easy Bolt Cutter	290
Non-Breakable Messenger Hangers	341
"Non-Tune" Rectifiers and Accessories	223-243
Number Plate Holders	160
Nut Wrenches	296-300

O

Oblique Cutting Pliers	275-278
Octagonal Marking Tags	175
Oil Inlets	200
One-Hand Cable Rings	329
One-Point Neutral Relay	95
Open-End Wrenches	296-299

P

Packing Boxes and Oil Inlets	200
Padlocks—Perfection and Signal	159
Pads for Pole Climbers	321
Paint—"P. & B."	327
Pan Bottom Coppers	214
Panel Saws	307, 308
"Paragon" Grounds	169
Parkway Cable	182
Parkway Cable Fittings	148
Parallel Jaw Pliers	177, 278
Parts, Repair—	
Autoflags and Wig-Wag	
Model 1	28
Model 1-A	27
Model 1-B	26
Model 2	24, 25
Model 5	12, 13
Style "T"	18
Bells—Highway Crossing	
Number 222	57
Number 333	73
Number 444	71, 72
Number 555	63, 72
Number 666	74
Number 990	61
Style "A" and "AA"	75
Style "A.L." 50	69
Style "D"	59
Style "E"	65
Power-off Relays	242-243
Rail Contact	112, 113
Rectifier	240, 241
Relay (Section 3)	87
Paste—Soldering	325
"Paulus" Track Drill	196, 197
Payout Reels	315
Peavy	314
Pedestal Lamp Adjuster	44, 45
Peelers—Wire	293
Pencil Zincs	213
Perfection Locks	159
Perry Wire Peeler	293
Pexto Pliers	277
Pike Poles	316
Pilot Lights	20, 21

Digitized by Google

Description	Page No.
Pin Locks and Bushings	199
Pinnacles—Cable Post	149
Pins—Channel	188
Pins—Wood	338
Pipe Carrier Foundations—Concrete	158
Pipe Line Insulations	201
Pipe Taps	304
Pipe Tools	301-304
Pipe Vises	302
Pipe Wrenches	301
Plates—Ground	168
Plates—Motor End	23
Plates—Tie	202
Plates—Spark Gap	166, 167
Platforms—Inspection, Portable	22
Plier Pocket	323
Pliers—Crimping for Cable Rings	331
Pliers—Lineman's and Electrician's	275-279
Plungers—For Packing and Stuffing Boxes	200
Plymouth Tape	326
Pockets—Plier	323
Pocket Volt-Ammeters	252-254, 256, 267, 271
Pole Changer Switches	129
Pole Climbers	321
Pole Climber Straps	321
Pole Counters	294
Pole Line Hardware	349-351
Poles—Pike	316
Pole Steps	22, 340
Pole Supports	313
Pony Soldering Coppers	324
Porcelain Base Switches	128
Porcelain Covers—Battery	210
Porcelain Insulators	335, 336
Porcelain Terminal Blocks	178
Portable Electric Drills, Hammers and Saws	342-344
Portable Inspection Platform	22
Portable Storage Battery	218, 219
Portable Testing Instruments	245-272
Post Hole Augers and Diggers	313
Posts—Binding	180
Posts—Cable	150
Potentiameter Rheostats	248-251
Pots—Melting	324
Pouches—Belt	323
Pouring Ladles	324
Power-off and Series Line Relay Combined	103
Power-off Relays	234
"Premier" Lightning Arresters	162-166
"Premier" Seamless Sleeves	332
Preservative Paint—"P. & B."	327
Pressed Copper Thumb Screws	217
Primary Battery	210
Pruning Saws	308
Pullers—Cotter and Crank Pin	304
Pulley Blocks	280
Punches and Sets—Channel Pin	189
Punches—Rivet	304
Push Buttons	77, 127

Q

Quenched-Gap Lightning Arresters	162-165
Quick-Acting Rail Contacts	111
"Quick-Set" Focusing Device	44

R

Rail Contacts	110-114
Rail Hack Saw Frames	309
Rail Joints—Insulated	203
Railway Tool Grinders	355
Raising Forks	316
Ratchet Bit Braces	284, 286
Ratchet Counters	134
Ratchet Screw Drivers	288
Reamers—Burring	302
Recessed End Tie Plates	202
Rectifiers—Battery Charging, Non-Tune	223-232
Reducer Bushings	149
Reels—Payout and Takeup	315
Reflecting Type Marker Lights	21
Register or Hand Tally Counter	294
Regulating Resistances for Non-Tune Rectifiers	239
Relay Boxes—Iron, Wood	141-143
Relays—	
Combination Flashing and Interlocking	115
Flashing	116-121
High Voltage	100, 101, 104
Interlocking	84-93
Neutral	95-99
Power-off	234
Series Line	102
Time Interval	106-109, 118
Release Switches	131
Repair Parts—See Parts, Repair.	
Resistances and Resistance Units	170-174
Revolution Counters	134
Rheostats—Variable Resistances	174, 239
Rings—Cable	329, 330
Rip Saws	31, 32
Rivet Punches	304
Riveting Hammers	306
Rods—Ground	168
Rolled Pencil Zincs	213
Rollers—"Matlock" Cable	318
Roller-Smith Instruments	268-272
Round Battery Zincs	212
Round Marking Tags	175
Round Nose Pliers	275-277
Round Washers	340
Rosin Core Solder	325
Rubber Base Switches	129
Rubber Covered Wire	183
Rubber Gloves	291
Rubber Insulators for Test Clips	246, 247

Digitized by Google

Description	Page No.
Rubber Syringes	217
Rubber Tape	325
Rules—Boxwood and Zig-Zag	292
S	
Safety Straps	322
"Sampson" End Cutting Pliers	279
Sampson Zinc	213
Saws—Hand, Rip, Crosscut	30, 31
Saws, Portable Electric	344
Scoop Shovels	311
Screw Drivers	288, 289
Screws—Lag	339
Screws—Thumb	217
Sealed Glass Jar Storage Battery	220-222
Seamless Sleeves	332
Self-Fluxing Solder	325
Self-Heating Soldering Iron	351
Self-Locking Troubleman's Blocks	283
Semaphore Lamp—A. R. A.	46-49
Series Line Relay	102, 103
Service Insulators	335
Sets and Punches—Channel Pin	189
Shaves—Draw	290
Shave Hooks	318
Shingling Hatchets	305
Ship Auger Bits	285
Short Circuiting Push Button	127
Shovels and Shovel Handles	310-312
Side Cutting Pliers	275-278
Signal Foundation Bases	144, 145
Signal Padlocks	159
Signal Socket	45
Signalman's Portable Instruments	252-255
Signals—"Autoflag" and Wig-Wag	4-19
Signals—Highway Crossing	4-41
Sign Clamps	149
Signs—Crossing Approach Warning	138
Signs—Crossing Watchman's Stop	139
Signs—Danger, Cast Iron	137
Signs—Danger, Illuminated	42, 43
Signs—Highway Crossing	136, 137
Signs—Highway Crossing, Illuminated	42, 43
Signs—Stop, Illuminated	35, 36, 42
Simonds Saws	307
Simplex Wire Stripper	293
Single Bitted Axes	305
Single Contact Lamp Socket	45
Single Groove Channel Pins	188
Single Purchase Lineman's Tool	282
Single Stroke Bells	76
Single Track Approach Warning Signs	138
Single Wave Rectifier	223-232
Skeleton Bells	78, 82
Skinners—Wire	293
Sleeve Clamps	274
Sleeves—Double Tube Wire	332, 333
Sleeves—"Premier" Seamless	332, 333
Sleeve Twister	274
Slicker	317
Slow Acting Rail Contact	111
Slow Burning Wires	184
S. M. Pinlocks and Bushings	199
Snips—Tinner's	290
Socket Framing Chisels	290
Sockets—Non-Grounding Signal	45
Solder	325
Soldering Coppers	324
Soldering Flux	325
Soldering Furnaces	352, 353
Soldering Torches	346-351
Solid Center Auger Bits	284
Solid Knife Handle Wrenches	300
Spades—Digging, Draining	310
Spark Gap Arresters	166, 167
Spark Gap Plates	166, 167
Speed Counters	294
SpeedWay Electric Tools	342-344
Spiral Ratchet Screw Drivers	288
Splicing Clamps	274
Spool Type Resistances	170
Spoons—Digging	311
"Spud" Digging Tool	317
Square—Steel Carpenter's	291
Square Washers	340
Stakes—Trunking, Wood	198
Standard Cable Posts	150
Standard Crossing Signs	136, 137
Staples—Insulated	326
Star Drill	290
Star Zinc	212
Station Stop Signal	50
Steel Figures and Letters	295
Steel Gains	337
Steel Guy Clamps	341
Steel Letters and Figures	295
Steel Shell Pulley Blocks	280
Steel Square—Carpenter's	291
Steel Stamps—Figures, Letters	295
Steel Tape Lines	292
Steps—Pole	22, 340
Sticks—Soldering	325
Stillson Pattern Pipe Wrenches	301
Stocks—Pipe Threading	303
Stop Banners—Watchman's	139
Stop Signs—Illuminated	35, 36, 42
Storage Battery	218-222
Storage Battery Hydrometer	216
Straight Side Battery Jars	215
Strain Insulators	336
Strand—Galvanized	334
Stranded Bonds	191
Strap Keys—Testing	130
Straps—Pole Climber	321
Straps—Safety and Vise	322
Strippers—Wire	293
Stuffing Boxes and Oil Inlets	200
Sub-base Junction Boxes	146, 147
Suburban or Parkway Cable	182
Supports—Messenger	341

Digitized by Google

Description Page No.

Supports—Pole 313
Switches—Battery, Telephone, Knife 128, 129
Switches—Emergency Release..... 131
Switch Rod Insulations..... 201
Syringe—Hard Rubber 217
Syringe Hydrometers 216

T

Tackle Blocks 280
Tags—Marking 175
Tally Counters 294
Take-Up Reels 315
Tamping Bars 316
Tape—Friction and Rubber..... 326
Tape Lines 292
Taps—Pipe 304
"T" Connector 180
Telegraph Shovels 311, 312
Telegraph Wire 185
Telegraph Zincs 211, 212
Telephone Condensers 132
Telephone Switches—Knife 128, 129
Terminals—A. R. A..... 178
Terminals—Brass 179
Terminals—Copper 176, 177
Terminals—Parkway Cable 148
Test Box—"Autoflag" 126
Test Clips—Universal 246, 247
Testing Instruments 245-272
Testing Jack and Key.....129, 130
Test Rods 248-251
Three Position Autoflags.....10, 11
Three-Wheel Pipe Cutters..... 303
Through Bolts 340
Thumb Screws 217
Tie Plates 202
Time Relays 106-109
Time Relay and Flasher Combined. 118
Tinned Channel Pins 188
Tinned Sleeves 333
Tinner's Hammer 306
Tinner's Snips 290
Tool Bags and Boxes.....320, 321
Tool Belts 323
Tool Grinder 345, 355
Tool Post Grinder 343
Torches—Gasoline Blow 346-351
Track Battery 210-222
Track Contact Boxes 110-114
Track Drilling Machines 196, 197
Track Resistance 170-174
Train Annunciators 122-125
Transformer Bells and Buzzers..... .....77, 80, 83
Transformers 233, 238
Tree Trimmers 305
Trickle Chargers (Non-Tune Rectifiers) 223-232
Triple Braid Weatherproof Wire... 184
Trips—Hand 86
Troubleman's Blocks 283

Description Page No.

Trunking and Capping 198
Trunking Stakes—Wood 198
Tub—Concrete Battery 155
Tube Tags 175
Twist Drills 192
Twisters—Sleeve 274
Two Position "Autoflags".....4-9, 16, 17
Type "O" Push Buttons..... 127

U

Units—Crossing Signal Light.....31-39
Units—Lighting 235-237
Units—Resistance 170-174
Universal Messenger Hangers..... 341
"Universal" Non-Tune Rectifier.224, 225
Universal or "L" Brackets..... 341
Universal Test Clips 246, 247
Universal Variable Track Resistances 172
Utica Pliers 276
Utility Portable Instrument 257
Utility Tool Box 321

V

Valley Battery Clips..... 247
Variable Resistances 171-174, 239
Vaults—Battery, Concrete 153-157
Vertical Stop Signs.....35, 36
Vises—Machinist's Bench 354
Vises—Pipe 302
Vise Straps 322
Vitriol (Copper Sulphate)..... 215
Vitrohm Resistor Units..... 171
Voltage Reduction Transformers... ..... 233, 238
Volt-Ammeters—Portable 252-256, 267-272
Voltmeters—Portable 257-272

W

Wagon Reel 315
Wall Mounting Transformers...233, 238
Walworth-Parmalee Pipe Wrench.. 301
Warning Signs—Approach 138
Washers—Square, Round 340
Watchman's Stop Banner..... 139
Watertight Push Button..... 77
Wattmeter—Portable 260, 263
Weatherproof Bells and Buzzers...56-86
Weatherproof Line Wire 184
Weber Joints 205
Welded Bonds 190
Wells—Battery Concrete 153-157
Western Climber Straps..... 321
Weston Instruments 263-267
White Fibre Tags..... 175
Wig-Wag Signals 4-19
Wire and Cable Grips 281-283, 319
Wire and Cable Terminals 176, 177
Wire and Sleeve Clamps 274
Wire—Bonding and Line.....184-187

Digitized by Google

Description	Page No.
Wired Battery Elevators	151, 152
Wire Eyelets	177
Wire Eye Pliers	177, 278
"Wireform" Solder	325
Wire—Fuse	133
Wire Gauge	291
Wire Insulated	183, 184
Wire Peelers and Skinners	293
Wire Sleeves	332, 333
Wire Tools—Lineman's	282
Wood Battery Boxes	153
Wood Chisels	290
Wood Levels	292
Wood Pins	338
Wood Relay Boxes	143
Wood Shell Pulley Blocks	280
Wood Trunking and Capping	198
Wood Trunking Stakes	198
Wrenches	296-301

X

"Xing" Protection Devices	4-54

Y

"Yankee" Automatic Drills and Screw Drivers	288

Z

Zig-Zag Rules	292
Zinc Cleaners	217
Zincs—Battery, All Kinds	211-213
Zinc Scrapers	217

Digitized by Google

Memoranda

Digitized by Google

Memoranda

PRINTED IN U. S. A.

W. P. DUNN CO., PRINTERS
CHICAGO

Digitized by Google

Digitized by Google

UNIVERSITY OF MICHIGAN
3 9015 01347 0102

Digitized by Google

Digitized by Google